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Cross-sectoral policy impacts between forestry and other sectors

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Foreword

In March 2001, the FAO Committee on Forestry (COFO) requested FAO to assist countries in incorporating linkages between sustainable forest management and other sectors, including agriculture. COFO also requested that FAO develop effective national policy frameworks and national forestry programmes, promoting information exchange between forestry and related sectors.

As a result of this demand coming from FAO member countries, the Forestry Policy and Information Division of the Forestry Department initiated a series of studies on available information and research needs, developed seven country case studies and organized a technical meeting[1] in September 2002 in FAO, Rome, to discuss these inputs.

The objectives of the present paper are:

- to present current policy and legal frameworks to help better understand cross-sectoral policy impacts;
- to present examples of specific country issues and solutions;
- to indicate instruments and institutions arrangements useful in order to optimize policy impacts according to forest development stages;
- to show the integrated system of environmental and economic accounting as a tool to collect, analyze, monitor and evaluate information on policy impacts across sectors; and
- to indicate ways and means to enhance the capacity of actors to coordinate their policy roles through better information and knowledge sharing and participation.

The target audiences are policy analysts as well as policy-makers, forest managers, representatives from stakeholders and non-governmental organizations, and researchers and teachers who need information on this subject and have to deal with cross-sectoral policy issues in their daily work. The public in general, concerned with the sustainable management of forests and their contribution to people's well-being, is another important target group.

The publication was prepared under the leadership of Manuel Paveri, Chief, Policy and Institutions Service of the Forestry Department of FAO. Yves C. Dubé, Forestry Officer, has coordinated the work and contributed substantially to the publication. Many officers from within and outside FAO have also contributed to the process and made suggestions to improve the manuscript. The authors of the chapters are Franz Schmithüsen from the Department of Forest Sciences of the Swiss Federal Institute of Technology, Davide Pettenella from the Territorial and Agroforestry Systems Department of the University of Padova, William F. Hyde, CIFOR Research Associate, Glenn-Marie Lange from the Institute for Economic Analysis of New York University, and Margaret A. Shannon from the University of Buffalo School of Law. Ms Eileen Nolan provided editorial assistance along the various drafts of the manuscript and Mr Marco Perri assisted in the preparation of the CD-ROM.

Those involved in preparing or taking policy decisions concerning sustainable forest management may use this publication as a reference framework. It is hoped that the approaches recommended will be widely adopted. The Forestry Department will continue to document progress of country members in this field and develop further concepts, methodologies and tools to be used by countries to deal with this issue.

R. Michael Martin
Director
Forestry Policy and Information Division
Forestry Department

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[1] Reports of country case studies and proceedings of the technical meeting are presented in Appendix on CD-ROM.

Acronyms

ASEAN	Association of Southeast Asian Nations
CBD	Convention on Biological Diversity
CCAB-AP	Central American Council for Forests and Protected Areas
CCAD	Central American Commission on Environment and Developm
CCD	Convention to Combat Desertification
CEFDHAC	Conference on Central African Moist Forest Ecosystems
CGE	Computable general equilibrium
C&I	Criteria and indicators
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Species
COST	Committee on Scientific and Technical Action
CPF	Collaborative Partnership on Forests
CSD	Commission on Sustainable Development
DESA	United Nations Department of Economic and Social Affairs
EC	European Commission
ECE	Economic Commission for Europe
EEC	European Economic Commission
ECOSOC	United Nations Economic and Social Council
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FSC	Forest Stewardship Council
FCCC	Framework Convention on Climate Change
GEF	Global Environment Facility
GDP	Gross domestic product
GHG	Greenhouse gases
IBAMA	Brazil Institute for the Environment and Renewable Natural Resources
IFF	Intergovernmental Forum on Forests
IIED	International Institute for Environment and Development
ILO	International Labour Organization
IMF	International Monetary Fund
IO	Input-output
IPCC	Intergovernmental Panel on Climate Change
IPF	Intergovernmental Panel on Forests
ISO	International Organization for Standardization
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union
IUFRO	International Union of Forestry Research Organizations
MCPFE	Ministerial Conference on the Protection of Forests in Europe
NDP	Net domestic product
NFP	National forestry programme
NGO	Non-governmental organization
NSCB	National Statistical Co-ordination Board

OECD	Organisation for Economic Co-operation and Development
SADC	Southern African Development Community
SAM	Social accounting matrix
SAP	Structural adjustment programme
SEEA	System of Environmental and Economic Accounts
SEK	Swedish krona
SFM	Sustainable forest management
SNA	System of National Accounts
TCA	Treaty for Amazonian Cooperation
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFF	United Nations Forum on Forests
WRI	World Resources Institute
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

Introduction

The influences of public policies on the development of the forestry sector have been recognized for some time. Suffice it to recall, for example, the work of Repetto and Gillis[2] and more recent work of the Center for International Forestry Research (CIFOR)[3] on the causes of deforestation in tropical countries. The United Nations Conference on Environment and Development (UNCED) (Rio de Janeiro, 1992) stressed the importance of harmonizing sectoral policies (environment, economic and social) to achieve sustainable development. The international dialogue on forests during the 1990s pointed to the role of non-forest policies in discussing the ways and means to achieve sustainable forest management (SFM).

A FAO survey[4] of cross-sectoral policy impacts in forestry, carried out in 2001, provided ample examples and confirmed that public policy from many areas has an impact on forests. Forestry should therefore engage with relevant sectors and policy domains to achieve its goals. In Johannesburg in September 2002, the World Summit on Sustainable Development (WSSD) recommended that countries enhance their political commitment to achieve SFM taking into account the linkages between the forestry sector and other sectors through integrated approaches. A number of new international initiatives and instruments (e.g. Convention on Biological Diversity, Convention to Combat Desertification, Proposals for Action of IPF and IFF) have also been taken or created over the last decade. As a direct consequence, decision-making concerning natural resources management has become more complex at national and local levels.

The review[5] of available information and considerations on further research on cross-sector linkages in forestry found that:

- research studies based on policy analysis that examine in detail the nature of cross-sectoral linkages are still scarce even if more investigations have recently been undertaken;
- available policy analyses focus on few issues: deforestation processes in the tropics and subtropics, and increased nature protection in forest areas of industrialized countries;
- the nature and importance of cross-sectoral linkages depends on the regional and socio-economic context;
- findings on the combination of relevant policy linkages and on the specific situations in countries of different regions are still missing;
- positive impacts of public policies on sustainable forest management have so far rarely been examined. The same holds true for positive contributions and impacts of forest policies on other public policy targets;

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[2] Repetto, R. & Gillis, M. (1988). Public policies and the misuse of forest resources. Cambridge University Press, Cambridge and New York.

[3] Kaimowitz, D. & Angelsen, A. (1999). The World Bank and non-forest sector policies that affect forests. CIFOR, Bogor, Indonesia.

[4] Broadhead, Jeremy and Duhé, Y.C. (2002). Cross-sectoral policy impacts in forestry. Voluntary paper submitted to the Secretariat of the 12th World Forestry Congress. FAO, Rome.

[5] Schmithüsen, F., Bisang, K. & Zimmermann, W. (2001). Cross-sectoral linkages in forestry – review of available information and considerations on further research. Working Paper, Policy and Institutions Branch, Policy and Planning Division, Forestry Department, FAO, Rome.

- one needs to understand and interpret the institutional framework, the role of the forest administration and the contributions and potentials of the forest sector as one of many links in a wider system of many actors and policy options in order to reach sustainable management of the natural resource base.

A FAO interdepartmental task force discussed these findings and in May 2001 recommended that country case studies be developed to illustrate specific issues and solutions in a broad range of ecosystem and socio-economic contexts. Their purpose was to provide concrete advice to policy-makers, to further define or broaden issues beyond deforestation for example, and to include in the analysis positive impacts of public policies considering non-commodity outputs of forests and environmental services. In effect, these issues were identified as having significant positive linkages with other sectors of the national economy, and seen as potential entry points for improving cross-sectoral policy impacts in terms of enhanced coordination in policy formulation and implementation, thus minimizing negative impacts on forests and ultimately on people's well-being.

The FAO technical meeting (September 2002) reconfirmed that, in practice, appropriate instruments and institutions are necessary to promote non-commodity outputs of forests and mitigate the negative policy impacts on them. The roles of actors are also critical and often determine which policy is to be successful (effective) or not. In effect, the following principles were recommended[6] for inclusion in a future agenda for action and a proactive dialogue between forestry and other sectors:

- take a broader view in forest policy and planning, adopting an integrated spatial approach towards SFM, as well as actively participating in other sector policy processes;
- improve policy decision-making and governance by facilitating the participation of all actors at all levels for effective policy implementation;
- promote the use of an integrated system of economic and environmental accounting to measure and monitor cross-sectoral policy impacts;
- enhance policy coordination and collaboration including the assessment of trade-offs between policy options;
- establish appropriate policy instruments and provide support to local suppliers of forest public goods in order to correct market failures.

This FAO forestry paper draws on currently available information and on the findings and recommendations of the FAO technical meeting. It is divided into five chapters, each written by a different author. All chapters have been revised to ensure consistency of text and presentation.

Chapter 1 sets the stage for understanding cross-sectoral impacts of public policies. Important trends such as globalization, privatization, participation or increase and diversification of society's demand for forest goods and services are described as forming the context in which these impacts are taking place. Cross-sector linkages between different public policies have an immediate or indirect influence on the behaviour of landowners, forest users, governmental agencies and NGOs. The role of governments in direct interventions in society but also increasingly as mediators between societal actors is discussed, including network management and the appropriate choice of policy instruments to exercise the desired influence on landowners and users, and ultimately on the state of forests. The chapter stresses the importance of the combined outcomes and results from policies and legal instruments that address economic, social and environmental issues and of their positive and negative effects on sustainable land management practices. There is a considerable need to focus on public capabilities to manage complex political networks with a wide range of stakeholder interests in different land use systems and management practices.

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[6] Proceedings of FAO technical meeting on cross-sectoral policy impacts between forestry and other sectors. Rome, 18-20 September 2002.

Chapter 2 presents a mosaic of national and local situations. Examples from Brazil, Italy, Mali, Mexico, Romania, Tanzania and Thailand case studies are presented. Each country situation varies according to local socio-economic and ecological contexts. Common features and most influential external policies are reported. The general weakness of the forestry sector and its marginal role in public decision-making processes related to macroeconomic and rural development policies are identified as the most common elements characterizing national and local situations. These problems cannot be solved by trying to protect and isolate the forestry sector. On the contrary, there is an urgent need to highlight the multi-faceted contributions that forest resources make in sustaining the well-being of communities.

Economic considerations on appropriate instruments and institutions are made in *Chapter 3*. It introduces a forest organization or taxonomy that features three characteristics - location, labour (a variable that is related to population for some economic assessments) and local institutions - that determine which forest areas are the sources of most forest resource uses and, therefore, which forest areas are under greater risk and are of greater importance for immediate policy action. This taxonomy is subsequently used in a discussion of taxes, incentives and regulations that alter the different forested areas and their important commodity and non-commodity outputs. Adjacent sectoral policy and institutional spillover effects including infrastructure and property rights are considered. The last section of the chapter discusses five key forest products and environmental services: i) timber and non-timber forest products, ii) carbon sequestration to protect against global climate change, iii) erosion control and general watershed protection, iv) biodiversity and critical habitat, and v) tourism. It is made clear in the analysis that a number of policies can have favourable consequences for the protection of particular forest resources.

Chapter 4 describes the potential use of the system of environmental and economic accounts (SEEA) for measuring the cross-sectoral benefits of forestry to other sectors of the economy and impacts on forestry from non-forestry sector policies. It identifies the relevant components of SEEA and develops a framework that may be used for economic analysis of the cross-sectoral policy linkages contributing to better sectoral and macroeconomic policy-making by governments towards forest conservation. A brief introduction to SEEA is first made which is followed by a review of country experiences with forestry accounting and the use of accounts for policy analysis. Then a framework based on SEEA is developed that will contribute to a better understanding of cross-sectoral policy impacts on sustainable forestry. Links between SEEA and sustainability indicators for forestry are provided. The chapter stresses that SEEA forest accounts demonstrate the economic benefits of forest ecosystems to non-forestry sectors, including rural development, agriculture, fisheries, tourism, municipal water supply and other agencies. Information from these accounts is a powerful incentive to build an alliance among stakeholders in different sectors. In addition, SEEA accounts provide a useful technical framework for assessing the total economic contribution of forests. This implies linking information about forestry to the use of other resources and to the broader economy. It also allows integrating forestry policy with national development and monitoring interactions and feedback across different industries.

Chapter 5 develops a framework for a participatory policy process aimed at improving the capacity of actors to coordinate and integrate their policy roles. Issues of power and participation are considered within an iterative governance framework. Cross-sectoral and inter-sectoral policy coordination requires improved communication and is a complex process of change and transformation in the roles of actors, organizations and institutions as new relationships grow, new priorities emerge through conflict and compromise, and new and old actors gradually shape identities over time. The final section addresses changes occurring and needed to build governance institutions that support participatory processes and ensure that decisions are accountable and legitimate within a political community.

In summary, to take advantage of positive and reduce negative policy impacts between sectors implies that concerned actors:

- identify sectors and other actors that have common versus specific interests and goals;
- exchange information and knowledge on policies, emerging issues and plans;
- monitor progress and take proactive initiatives in response to policy and legislation changes in other sectors;
- propose revision of policies and legislation to reflect new concerns;
- support cross-sectoral scientific policy analysis (as much as possible quantitatively oriented);
- strengthen the work of concerned institutions; and
- promote intensive involvement of forest sector stakeholders and civil society.

Chapter 1

Understanding cross-sectoral policy impacts – policy and legal aspects

Franz Schmithüsen

NEED FOR CROSS-SECTORAL POLICY COORDINATION

The conditions for policy-making have changed fundamentally as reflected in trends towards globalization, multilevel policy networks, privatization and increased democratic participation **(Box 1.1)**. International treaties and norms add new dimensions to the existing patterns of governance at national, regional and local levels (FAO, 1999; UNFF, 2001). The distinction between private enterprise and public administration is increasingly permeable. The private sector has to deal with the incorporation of external effects in management and public authorities start to work with models from business administration. Current trends in national and international politics are important because they:

- influence the behaviour of citizens, land users and land managers;
- lead to an increasing number of linkages among different public policies and laws;
- produce complex political networks and multilevel policy frameworks;
- require more effective forms of cooperation, conflict resolution and public arbitration;
- need concerted and integrative approaches in policy implementation;
- determine the competences and steering processes among public administrations;
- require specific information on economic impacts and trade-offs;
- need evaluation of the combined policy results.

Box 1.1 – Important trends influencing public policy and law

- Globalization of the economy and of trade.
- Internationalization of environmental and nature protection.
- Privatization and a changing understanding of the role of the state.
- Participation of stakeholders and the public.
- Influence of non-governmental organizations in public decisions.
- Diversification of society's demand for forest goods and services.

People want politics and laws to be transparent and responsive to their needs. They expect that measures taken by government and public administrations are effective and efficient. People also demand more information on economic and environmental issues and more participation in policy formulation and implementation. In such an environment policy-makers and civil servants need to take into account important linkages which exist between different public policies as well as their local, national and international dimensions. Policy development and implementation need to be based on substantial and flexible interactions between government and the stakeholders concerned, such as citizens' action groups, land users and land managers, private companies and community organizations.

Civil society expectations are high and extend to new issues, in particular to environmental protection and sustainable development. Society's demands for goods and services from forests and the forest sector are changing and growing. Forests are expected to provide timber, protect watersheds and soils and provide shelter from natural disasters. They are expected to host a wide range of unique species and offer a scenic backdrop for sportsmen and city dwellers seeking tranquillity and recreation. New demands, such as the use of forests as carbon sinks, illustrate that the social meaning of forests is a dynamic one. It can be subject to rapid and unpredicted changes. SFM is one option among several land use alternatives. This means that there is competition between maintaining the forest cover and land clearing, and between the forestry sector and other sectors of the economy. In fact, in countries with a rapidly growing population the conversion of forests to other land uses is often a necessity and may, if properly managed, contribute to the sustainable development of a society. However, the growing pressure on forest lands is to the disadvantage of many users and often the poorer part of the population. In other regions and countries, forested areas increase and provide new opportunities for goods and services.

A *framework* of public policies and laws with coordinated aims, strategies and instruments is essential in order to overcome complex problems and develop more comprehensive solutions that correspond to the overall goal of sustainable development. Taking cross-sector impacts into account and approaching problems in a more integrative manner are key concepts for improving the effectiveness and efficiency of public policies, legislation and administrative decisions and activities. An important trigger for nations and the international community to focus on cross-sector impacts and policy linkages was UNCED. In Agenda 21, cross-sector approaches are seen as a prerequisite for the sustainable development of society. The separation of land management issues by various public policies is considered as a reason for the lack of development which balances economic advancement, sustainable ecosystem management and environmental protection. A more comprehensive approach is advocated which integrates economic, social and environmental policy objectives. National governments and the international community are advised to pay more attention to cross-sector impacts and to develop more consistent public policy frameworks for sustainable development (Agenda 21, Chapter 8 - Integrating environment and development in decision-making). The need for more coordination between sectors relevant to forestry development and forest resources conservation is underlined, for instance, in Chapter 11, Sec. 31(e), of Agenda 21 on combating deforestation. It is also advocated in Section 9 of the non-legally binding authoritative statement of principles for a global consensus on the management and sustainable development of all types of forests adopted during UNCED. The Intergovernmental Panel on Forests (IPF), and subsequently the Intergovernmental Forum on Forests (IFF), called for inter-sector approaches and coordinating mechanisms with all programmes and projects affecting forests. In particular, issues affecting land use, poverty, food security, energy needs and environmental protection are seen as important (Commission on Sustainable Development, 1996). Enhancing policy coordination and fostering cross-sector cooperation is now a core element in the mandate of the United Nations Forum on Forests (UN ECOSOC, 1999, 2000; UNFF, 2001).

The World Summit on Sustainable Development (WSSD) reconfirmed the outcomes of the major United Nations conferences and international agreements. The plan of implementation adopted at WSSD builds on the achievements made since UNCED and expedites the realization of the remaining goals. The decisions of WSSD 2002 place forests in a coherent and comprehensive context of sustainable development and as a natural resource base for economic and social advancement. They acknowledge the multiple and varying functions of forests for poverty alleviation, as raw material and energy sources, and as natural habitats and environment. The implementation plan highlights the role of forests in several policy domains such as natural resources management (Section 24), agriculture (Section 40d), desertification (Section 41d), mountains (Section 42b) and sustainable development for Africa (Section 62n).

It also shows that forests and forestry development are closely linked to the decisions that address measures on climate change (Section 38), biodiversity (Section 44) and the institutional framework for sustainable development (Section 137 ff.). This implies that international processes, for instance the goals of the climate change and biodiversity conventions, have to consider more systematically the need for improvements in the forest sector.

It follows as well that forest policies have to integrate more strongly with environmental and nature protection objectives. The provisions on forests (Section 45) focus on the importance of SFM of both natural and planted forests for timber and non-timber products as essential to achieve economic and social progress. It stresses forest management as a critical means to eradicate poverty, to reduce significantly deforestation and to halt the loss of forest biodiversity and land and resource degradation. Its role in improving food security and access to safe drinking water and affordable energy is specifically mentioned. Altogether, SFM provides multiple benefits of both natural and planted forests and trees, and contributes to the well-being of the planet and of humanity. Achievement of SFM, nationally and globally, through partnerships among interested governments and stakeholders, including the private sector, indigenous and local communities and non-governmental organizations (NGOs), is an essential goal of sustainable development.

Cross-sectoral linkages are now important issues within the system of the UN agencies. FAO has launched several programmes in agriculture, water management and forestry which examine positive and negative impacts of relevant policies and legislation on the integrated use of natural resources. Other agencies such as UNDP are committed to more effective inter-agency coordination and support of member countries in order to foster a more consistent approach in addressing sustainable management of the resource base. The World Bank and the Regional Development Banks in Africa, Asia and Latin America play a catalysing role in integrating different public policies within the overall framework of sustainable development. The statements of the World Bank underline the urgency to contribute to the dialogue with governments towards more effective coordination of public policies and projects. A new and more comprehensive cross-sector approach is considered to be of particular importance. The need for such an approach follows from the observation "that the impacts on forests and forest-dependent peoples of what the Bank does in support of policy reforms and investments *outside* the forest sector are equal to, or even greater than, its forest sector activities. Non-forest interventions, such as rural development and infrastructure programs and projects and economic adjustment measures, must be carefully formulated to take account of their influence on forest outcomes" (World Bank, 2002: 2).

In accordance with Chapters X and XI of the Plan of Implementation of WSSD 2002 addressing the institutional framework for sustainable development, the international development banks are increasingly using their comparative advantage in analyzing and coordinating policies and projects and in assisting governments to launch and implement cross-sector approaches that foster SFM or ensure that negative cross-sector impacts of investment projects in areas with high conservation and protection values are minimized.

Investment projects now focus to a considerable extent on the combined objectives of poverty alleviation, economic development and protection of environmental values.

RELEVANT POLICY DOMAINS

Public policies

The term public policy designates the contents and choices made in specific fields or sectors as determined by dominant plans, goals and actions which regulate important issues of public concern (Parsons, 1997: 16). Public policy analysis describes these contents and explains them in relation to the prevailing institutional setting, the polity and, as influenced through political processes, the politics. Public policies and law are important because they:

- steer government intervention;
- influence markets and market transactions;
- concern the immediate decisions of consumers;
- have important impacts on the behaviour of land users and land managers.

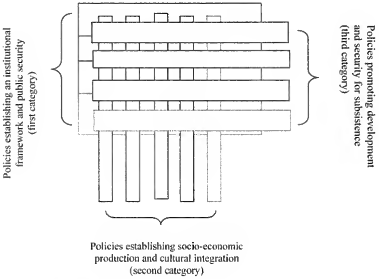
In a state of law public policies are based on constitutionally founded competencies of the state and are determined through laws, regulations, rules and other decisions of public authorities. Nationally or locally relevant combinations of policies change over time. Driving factors are new economic needs, political demands and social values. Specific combinations of policy domains and laws depend, for instance, on:

- the stage of socio-economic development;
- the demands for goods and services;
- the prevailing cultural values;
- the extent of forest area and its biodiversity;
- the productivity and fragility of ecosystems;
- the establishment of a framework for the promotion of development providing subsistence and well-being as, for example, through technology, environmental or educational policies.

Figure 1.1 illustrates the dependencies between categories of public policies. Policies of the first category have strong forward linkages with most other policy domains. The establishment of a constitutional framework and of a public security system are fundamental to other policy areas as they provide the foundation for state interventions through guaranteeing the rule of law. Policies of the second category have strong backward links to the constitutional framework as well as important forward linkages to the sector and cross-sector policy programmes of the third category. It is obvious that economic and finance policies, for instance, influence many other policy areas. There are also important feed-backs from the third category of policy domains inasmuch as education, technology or environmental conditions determine economic productivity and income generation. Policies of the third category promoting development, security of subsistence and the well-being of people depend to a large extent on backward linkages to social and economic policies as well as on the constitutional framework that regulates, for instance, ownership rights and entrepreneurial activities. Sector policy programmes also show a high degree of positive and negative connections among each other.

The fact that public policies are complementary and have a considerable number of linkages among each other has far-reaching consequences for the way in which states and governments are able to steer political decision and implementation processes. Many issues, in fact, cannot be tackled by one single policy domain or body of specific legislation. Effective solutions for most societal problems have to be found through different agencies and actors as well as through coordination among the goals and instruments set out in different policy areas.

Figure 1.1 - Relationships between different categories of public policies


Policies establishing an institutional framework and public security (first category)
Policies promoting development and security for subsistence (third category)
Policies establishing socio-economic production and cultural integration (second category)

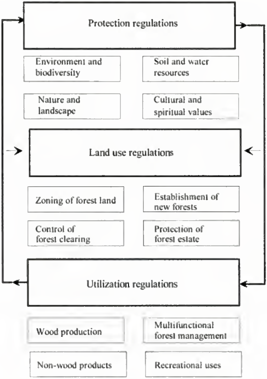
Source: von Prittwitz *et al.*, 1994 : 54

Forest policies and law

The objectives of national forest policies have become more diversified and comprehensive and acknowledge both the importance of production as well as conservation. Their goals refer to the role of forests as multidimensional resources, their economic potential and their importance in the environment. They address a variety of ecosystems, the need to maintain biodiversity and the preservation of forest lands for reasons of nature and landscape protection. Policies stipulate increasingly the need to balance timber production, recreational uses and the protection of forests for soil and water conservation and against impacts from natural calamities. With regard to conservation and sustainable utilization, different types of policy objectives and regulations exist (**Figure 1.2**). Protection regulations refer to measures on environment and biodiversity, nature and landscape protection, and restrictions associated with cultural and spiritual values. Land use regulations include zoning of the forest land, control of forest clearing, protection of the permanent forest estate and the creation of new forests through afforestation. Utilization and management regulations determine responsibilities of forest owners with regard to sustainable production of wood and non-wood products, the protection of soil and water resources as well as public access to forests and recreational uses.

An important aspect in recent forest policies is changes in the role of national, regional and local authorities. There is a trend to shift or delegate constitutional competencies in forestry matters to regional governments or local entities. Where the national level remains responsible for forest conservation and development, sub-national entities become more strongly involved in policy formulation and implementation. Altogether, this provides more opportunities for participatory political decisions and for the negotiation of locally adapted solutions. Transfer or delegation of competencies allows for more participation of people in democratic decision-making processes in which they can express their specific interests and values associated with forest management and utilization.

Figure 1.2 - Forest policy regulating protection, land use and utilization



As a result of policy and institutional changes a significant acceleration in the revision of forest-related laws has taken place around the world (FAO, 1999; FAO, 2002). Important trends in new and revised legislation concern provisions on local forest management, environmental functions of forests, management planning, forest utilization contracts and procedures for implementation (**Box 1.2**).

Box 1.2 – Important trends in forest legislation

Promoting local forest management: Recent law reforms give a great deal of attention to the promotion of local management arrangements: first, mechanisms for the devolution of forest management to local communities, user groups or family households are established in order to facilitate co-management agreements, community forestry leases and the delineation and titling of communal or cooperative forest tenure; second, in some countries new forest legislation shows increased recognition of historical land or territorial claims of local people. Indigenous people's rights have thus been acknowledged in several countries in the African, Asian and Latin American regions. In Central and Eastern Europe, new laws contain provisions which allow the restitution of land including natural forests and commercial plantations to dispossessed communities and individuals; third, the move towards decentralized competences to local governments in forest management leads to use and management regulations which provide more consultation and participation of local communities and the public.

Enhancing environmental functions of forests: In recent years and particularly since UNCED in 1992, national legislation in many countries reflects more explicitly the environmental importance and the need to protect more systematically the biodiversity of forest ecosystems. This is apparent in the preamble or in the statement of objectives of many forest laws which refer to protection and preservation objectives, sustainable forest management and the country's international commitments. More specific provisions relate to inventories, planning procedures and classification regulations which allow a more integrative use of forest resources balancing economic and environmental requirements. Recent forest laws allow for more flexible land classifications including the designation of forest nature reserves, watershed forests and protection forests. Environmental impact assessment is another important tool that gains importance, either by explicit reference in forest legislation or through general environmental laws.

Forest management planning: There is a discernible trend in forest legislation to broaden the objectives of management planning. Legal provisions increasingly oblige public and private planners to use not only economic planning criteria but also to consider a range of ecological and social requirements. Plans for local management units should be consistent with regional and national land use planning and with nature and landscape protection programmes. Recent forest laws also provide for more opportunities of local stakeholders and the public to intervene and participate in forest management planning. An important aspect in making the legal provisions more effective is the need to determine the legal status of management plans.

Forest utilization contracts: In countries in which public authorities allocate to the private sector timber harvesting and forest management rights through concessions and forest utilization contracts, the legislative framework regulating this form of tenure needs further improvements. This refers in particular to the definition of procedures and criteria that govern the granting of concession and contract tenure. More recent laws and regulations determine in some detail the framework leading to the awarding of a contract and the basic elements for an auction and bidding system. This refers, for instance, to the content of the call for bids, the form and content of submissions, deadlines and decision-making time frames, and the professional qualifications of auctioneers. The law may specify under which conditions governments may use non-economic criteria to distinguish among competing bids. Specifying the process of how to award contracts leads to greater transparency and accountability, establishes equal conditions among competing firms and ensures that technical specialists are involved in the decision-making process. A consistent process of evaluation and granting forest utilization contracts may also better promote the interests of third parties and the public.

More emphasis on implementation: While it is obvious that considerable efforts have been made to adjust forest laws to a widening range of economic, social and environmental concerns and demands, the most important problem at present is to overcome the discrepancy in many countries between the content of law and its implementation on the ground. Effective legal reforms need to be commensurate with the capacity and willingness of governments and other private and public actors to implement new legal commitments that need to be monitored closely with regard to the effects they produce.

On the whole new policies and legislation have become more proactive in many countries and rely more widely on incentive and monitoring measures. They set minimum requirements and performance standards. They confirm forest owner rights in using services offered by the private sector and promote contractual arrangements with third parties. Guidelines for best management practices are increasingly used. Implementing forest regulations implies precise demands on the tasks and services to be performed by administrations and public entities with more operational flexibility in managing human and financial resources. The allocation of financial resources in relation to specific targets based on global budgeting and/or service contracts necessitate the development of criteria for financial controlling. They measure efficiency (output/input), effectiveness (attainment of objectives) and economy (real costs/standard costs) based on best practices. These developments require on the side of public authorities more emphasis on process-steering and a shift from individual decisions and projects to comprehensive land management and resources conservation programmes.

Policies and law in other sectors

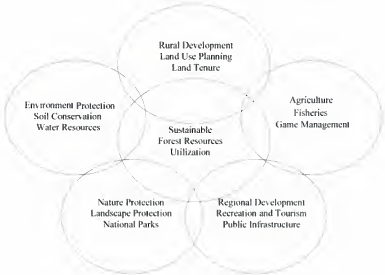
There is a strong interdependence between forest policy and other public policies of a more general scope such as economic, natural resource and environmental policies. They have substantial positive or negative effects on the development and implementation of forest policy programmes and may thus foster or impede sustainable land use and forestry practices. The development of forestry and wood processing is determined by such factors as population and economic growth, liberalization of trade, and technological innovations which create new demands and markets for wood products as well as for other goods and services. An important factor is the price of energy which influences the relationship between processed wood products and competing materials. Public policies related to economic growth, employment and social affairs; energy and industry; research, technology development and education; infrastructure and communication set the conditions for the development of the forestry and wood processing sector.

Forest conservation and sustainable forestry practices are prominent examples of political issues that are addressed by several policy domains. A number of policy domains that are today of particular relevance have emerged and gained importance during the past 30 years. They relate to environmental protection, nature and landscape conservation, land use planning and regional development. Policies addressing specific sectors of the economy such as agricultural policy, water protection and water management policies, fishery, hunting and wildlife conservation policies are of great importance in this context (**Figure 1.3**).

A fundamental element is the principle of sustainable land use and management of the natural resource base in an integrated manner. It has immediate and far-reaching consequences for the status and uses of different categories of forest lands. It leads to new approaches in regulating forest uses, management requirements and current forestry practices. Nature and landscape policy, for instance, provides increasingly that forest management be subject to review and assessment with regard to *ecological criteria*. It establishes a *de facto*, and in some countries a formal, participation of conservation and user groups in decisional processes. Ecological and landscape inventories become an important source of information, planning and monitoring forestry activities. It follows that forest owners and managers as well as public forest services have to consider ecological and protection aspects more intensively than in the past. This again encourages consultation processes among public and private stakeholders. It also calls for more explicit coordination among governmental agencies that have competencies in forestry matters, environmental protection, land use planning and rural development.

The growing complexity of public policy domains addressing land uses and management of the natural resource base is reflected in corresponding developments of legislation. While each country has its own constitutional context and traditions in organizing its administrative law system, one can nevertheless identify, in addition to the global trends mentioned at the beginning of the chapter, driving factors that have influenced legal changes since UNCED in 1992 (FAO, 2002). These, for instance, are concerned with transition to market economies, regionalization, good governance and devolution and decentralization of governmental powers (**Box 1.3**).

Figure 1.3 - Public policies with impacts on sustainable forest management



The content of legislation reflects the variety of socio-economic conditions and of the physical resource base within countries and regions. However, there are fundamental issues which have to be addressed by an appropriate legal framework for sustainable management of the natural resource base (FAO, 2002). Key questions to be asked in assessing strengths and weaknesses of legal frameworks regulating sustainable use of the natural resource base are:

- Does the law provide an appropriate positive regulatory environment for activities in support of sustainable development?
- Is the law relatively free of unnecessary regulatory constraints that could inhibit activities that are essential for achieving the goals of sustainable development?
- Are the mandates for different institutional actors clear, coordinated and desirable?
- Does the legal framework provide mechanisms by which people may obtain meaningful and secure rights to the assets essential for their pursuit of sustainable livelihood?
- Does the law enable the formation and empowerment of appropriate stakeholder organizations?

Box 1.3 – Driving factors influencing legal changes

Transition to market economies: With the collapse of centrally planned economies many countries have been faced with the need to create new legal institutions in order to allow a transition to a market economy. Fundamental legal changes have been undertaken in order to define property rights in land management, set a framework for exchanging such rights, determine the rules for the functioning of markets by demand and supply, and create the frame conditions to promote competition among the actors. Many countries have thus been engaged in legal reforms from changing their constitution and civil codes to laws on taxation, banking, status of companies and commercial transactions in order to create a modern national legal framework necessary for the functioning of a market economy.

Regionalization: Changes in national legislation result from the growing number of regional entities. This, for instance, is the case in countries engaged in the process of joining the European Union (EU) which are faced with the task of conforming laws on a wide range of subjects in agriculture and natural resources law to EU requirements. MERCOSUR, CARICOM and NAFTA are other regional entities which have influenced the respective national legislations of their members.

Good governance: The goal of good governance increasingly influences legal and institutional reforms. Concepts such as participation in decision-making, access to information, transparency and accountability start to influence law design in many sectors as well as the way in which governments interact with civil society on matters such as awarding forestry concessions, setting food control standards, or monitoring environmental compliance. The Declaration of the World Food Summit, for instance, gave special emphasis to the importance of strengthening the rule of law and good governance to solve socio-economic problems and achieving food security.

Devolution and decentralization: There is a growing move in many countries towards decentralization and devolution of government powers. Legal frameworks are being changed to reflect policies promoting local decision-making and community-based initiatives in a wide variety of fields. Decentralization gains importance as a strategy for reform in national governments and international agencies and finds expression in numerous legal instruments. The promotion of community initiatives and engagements figures prominently in current thinking about environmental and natural resource management. In forestry, water management, fisheries, land use, wildlife and other areas the emphasis is on moving away from more or less exclusive state competencies to stronger management responsibilities and property rights in local governments and communities. The political commitments made at UNCED, in particular Agenda 21, the Convention on Biological Diversity and the Forest Principles engage governments in reviewing legislation and property regimes in order to provide a better legal framework for local government and community-based natural resources management. This requires appropriate legislation which enables and guides such activities and in many cases a significant reorientation of legal texts and public institutions.

CROSS-SECTORAL POLICY IMPACTS

Cross-sectoral linkages between the forest sector and other sectors result from policies that have an immediate or an indirect influence on the behaviour of landowners, forest users, governmental agencies and NGOs. Most problems in the real world relate to many different issues and do not respect the borders of legally defined policy domains or formal competencies of governmental departments. Political decisions in one policy are dynamic elements which affect directly or indirectly other policies. Decisions made in one policy domain have usually positive and negative *effects* and often unforeseen repercussions in others. In fact many public policies show strong impacts from decisions taken outside of their own field of competence. Cross-sector policy *impacts* can thus be defined as the supporting or impeding effects from one policy on another one. They may be the intentional result of a coordinated process of policy formulation. Others may not have been intended by policy-makers and their effects are revealed only during the implementation process. Public interventions are, at any rate, not always well coordinated and may lead to contradictory policy results.

To a large extent the success or failure of a given policy depends on the *supportive or impeding impacts* that result from other policies. To assess the kind and directions of cross-sector effects among different public policies requires a thorough understanding of policy formation and implementation processes. The analysis has to take into account the combined outcomes and results from economic, social and environmental policies and law that influence forest conservation and forestry development. In a recent survey cross-sectoral policy impacts between forestry and other sectors have been examined (Broadhead, 2001; Broadhead and Dubé, 2002). The majority of the examples were from South and Central America (32 percent), Asia (27 percent) and Africa (11 percent). Over four times as many examples of external public policies impacting on forestry (71) were mentioned by the respondents than of forestry policy having an impact on other domains. Altogether 40 percent of the quoted cases refer to policies establishing the institutional framework, 38 percent were attributed to policies addressing specific economic sectors and 22 percent concern policies promoting development. In high-income countries a considerable proportion of impacts are associated with special economic sectors. In low-income countries policies establishing the institutional framework for forest management are of greater importance.

Box 1.4 gives an overview on typological elements which serves as a checklist in order to examine the characteristics of cross-sectoral impacts from different public policy programmes on forest conservation and forestry development. The listed elements facilitate comparative analysis of policy networks operating under different social, economic and ecological conditions. Each typological element is briefly discussed hereafter.

Public policy domains establishing a general institutional framework define the constitutional rules of state organization, the role of the public and private sector and the extent of intervention by government and public administrations. They establish procedural requirements for the involvement of people and interest groups in political processes and define rules for the settlement of societal conflicts. Policies of this kind relate to the macroeconomic framework, to political institutions and good governance, and to institutional aspects of social conflict resolution. Public policies that relate to specific economic sectors and to alternative land uses usually imply controversial objectives which need to be balanced in the broader context of sustainable development of the natural resource base. Policies and laws on agriculture and forestry, energy and water, or to transport and public infrastructure range in this category. Public policies promoting development and precaution for subsistence refer, for instance, to environmental protection, nature and landscape conservation, as well as technological innovation, education, research and public information. They are essential for maintaining and increasing future development options of society.

Regional economic and ecological context: Differences in population density, income opportunities or with regard to government institutions and competencies provide quite a different context for the implementation of public policies within a country. If one considers, for instance, the conditions of temperate and boreal forests as compared to those of tropical lowland forests, it becomes obvious that there are differences in the way public policy regulations operate and the effects which they produce. The same is true in comparing the conditions of densely populated regions as compared to areas with a low population density. The conditions of mountain forest areas (e.g. Alps, Andes or Himalayas) and the utilization of trees and forests in semi-arid and arid zones are addressed by other policy objectives and measures. Examples of the variety of policy and legislative goals and regulations under different ecological and socio-economic conditions are presented in the country case studies of Chapter 2. The physical conformation of the forest resources in a country, the prevailing economic and social context and the combination of goods and services in demand determine the policy framework in which they are managed.

Box 1.4 – Typological elements for specifying cross-sectoral impacts

Public policy domains

- Institutional policy framework
- Sector policy framework
- Development policy framework

Regional economic and ecological context

- Population growth and density
- Social product and per capita income
- International trade relations
- Importance of forest goods and services
- Environmental conditions
- Forest ecosystems
- Extent of forest area

Level of policy decision-making

- International
- Supranational
- National
- Sub-national

Policy instruments

- Regulatory instruments
- Incentive instruments
- Information instruments
- Process-steering instruments
- Organizational instruments

Direction of impacts

- Impacts from other policies on forestry policy
- Impacts from forestry policy on other policies
- Reciprocal impacts between forestry and other policies

Valence of impacts

- Positive impacts
- Negative impacts
- Neutral impacts

Source: Schmithüsen, Bisang and Zimmermann, 2001

Level of policy decision-making: Policy programmes originate from legislation and administrative decisions that are made at different levels of government. The constitutional repartition of competencies provides for national institutions and for sub-national public entities such as municipalities and local communes. In states with a federal constitutional structure there is a repartition between the constitutional responsibilities of the federal state and those of member states. An analysis of the relevant governmental decision-making levels and prevailing structures of public administrations is essential in order to understand the political network in which policies and legislation operate. The present trend to transfer or delegate an increasing part of national competencies and decision-making processes on forest resources management to sub-national levels and/or to local governments and institutions is of particular significance in this context.

Policy instruments: The choice of instruments plays an important role in designing and implementing a policy and produces different kinds of impact. Policies and regulations focus more and more on the determination of specific targets, precise commitments of the beneficiaries and accountability on proven results in relation to the committed public funds. Regulatory instruments are important in particular with regard to the protection of natural resources and the environment. Incentives gain importance, for instance, in promoting sustainable land uses, providing for multiple use management, maintaining biodiversity and preserving endangered ecosystems. Compensatory measures for landowners for performing specific tasks in the public interest become an important issue in integrated land management.

The *direction in which policy linkages operate* is another important aspect to be examined. Most of the available studies have focused so far on the influences of external policies on forests and forestry. How forestry policy objectives and instruments influence the objectives of other policy domains has until now not been given much attention. However, a meaningful examination of policy linkages between the forestry and other sectors demands a holistic approach which pays considerably more attention to the impacts of forestry policies on other policy domains. This refers in particular to positive policy linkages which result from protection forests and multiple-use forest management that exist towards agriculture, water resources management, rural development and environmental protection. A recent study on Bhutan's biodiversity policy shows, for instance, that major achievements in the domain of nature and landscape conservation result from a series of improvements in the country's national forest policy and legislation (Tsering, 2000).

Valence of impacts: Cross-sectoral policy links produce positive, negative or neutral effects in other domains **(Box 1.5)**. The criterion for qualifying an impact as positive or negative is to be judged under the perspective of the policy domain in which it operates. Altogether it is important to identify and analyze cross-sector impacts which contribute to a more efficient and productive use of land and forest resources. Impacts which show positive effects in several policy domains provide opportunities for cooperation and alliances. A similar situation exists if impacts result in negative effects on both sides and where both domains will benefit from a change of policies. A positive valence on one side combined with a neutral effect on the other leaves room for new approaches. Prospects for improvements also exist if negative effects in one policy area can be reduced with rather modest changes in the other. A more difficult situation exists if the policy links result from measures that produce substantial benefits in one policy domain and strong negative effects in another policy area. In such cases, which are frequent in land use and natural resources management, it is difficult to develop meaningful policy changes and cooperative arrangements. Political arbitration combined with concrete efforts to find alternative solutions in order to avoid or reduce negative effects are essential.

Available information: A considerable number of studies review policy developments at national and sub-national levels and contain information on cross-sector linkages influencing forestry development. They examine relevant public policies and stress the fact that their importance has to be identified in the context of a particular country and at a given time. This is the case, for instance, for a series of forest policy papers that have been published for the African, Asian and Latin American regions (FAO 1993; FAO, 1996a; FAO, 1998a). Legal frameworks in Latin and North America, Asia, Africa and Europe are addressed by publications of the FAO Law Development Service (FAO, 1998b; FAO, 1999; Cirelli and Schmithüsen, 2000; FAO, 2001b; FAO, 2002). A survey of relevant policies and cross-sectoral impacts according to broad ecological regions and socio-economic conditions has been undertaken by de Montalembert (1994, 1995). Country papers on national forest law development have been produced by the IUFRO Research Group on Forest Law and Environmental Legislation.

Box 1.5 – Positive and negative effects from external policies on forestry

Policy domain	**Positive effects**	**Negative effects**
Agriculture	*- Soil protection* *- Water management* *- Wind barriers* *- Rural forestry* *- Agroforestry*	*- Forest clearing* *- Overgrazing* *- Soil disturbance* *- Lack of regeneration*
Public infrastructure	*- Protection forests* *- Stand stability management* *- Infrastucture works* *- Access to areas*	*- Forest clearing* *- Increased utilization* *- Ecological disturbance*
Nature protection	*- Ecosystem conservation* *- Natural forest* *- Biodiversity*	*- Access restrictions* *- Management obligations* *- Production restrictions*

Important sources of information are publications and reports which focus on specific external public policies and their positive and negative impacts on forests and forest resources management. Policy analysis has come forward from authors associated with multilateral development institutions and deals mainly with forestry issues in the tropics and subtropics (Repetto and Gillis, 1988; World Bank, 1993; Contreras Hermosilla, 2000). Valuable sources of information are country studies elaborated and distributed by CIFOR in collaboration with other international research institutes and NGOs (CIFOR Polex Listserver). Recent studies examine, for instance, the role of national parks in maintaining tropical biodiversity, land use and watershed management, land tenure and resource governance, reforestation, environmental aspects and public incentives, paper production and environment, the political economy of pulp and paper and the impact of technological change on agriculture plantations especially forest losses. Another context where policy linkages have gained considerable attention is the work of the International Panel on Climate Change (IPCC, 2001).

INTERNATIONAL POLICY AND LEGAL FRAMEWORKS

Multilevel policy frameworks

At present, an increasing range of worldwide, continental and regional processes involving the United Nations as well as multilateral and supranational entities forms the international system. This enables governments to institutionalize both worldwide and regional cooperation and to establish consensus-building processes (FAO, 2002). International commitments to sustainable development based on the principle of joint responsibilities between the international community and states are driving forces which lead to an increasingly complex framework of multilevel policy impacts (**Figure 1.4**).

The issues at stake vary at different levels of the policy network. At the global level, free trade, environmental protection and biodiversity are dominant subjects. Forest-related aspects are increased industrial uses through access to new areas, reduction of large-scale deforestation and maintenance of a minimum proportion of natural forests. At the supranational level, major issues are structural changes in agriculture and the protection of the environment and water resources. Afforestation of marginal lands and criteria and indicators for sustainable forest development are of importance. At the national level, emphasis is on forestry and wood processing as productive sectors of the economy and on the regulation of forest management practices. At local level, multiple forest uses providing employment, protection and recreation are of immediate concern. Policy-making in complex multilevel governance offers new opportunities to develop more consistent solutions that satisfy different social groups and policy actors. **Box 1.6** indicates important policy networks and processes.

Box 1.6 – Policy networks and processes

- IPF/IFF and UNFF processes
- Collaborative Partnership on Forests
- Regional forest-related initiatives
- Conference on Central African Moist Forest Ecosystems (CEFDHAC)
- Yaoundé Declaration
- Southern African Development Community (SADC)
- Central American Council for Forests and Protected Areas (CCAB-AP)
- Treaty for Amazonian Co-operation (TCA)
- Association of Southeast Asian Nations (ASEAN)
- Ministerial Conference on the Protection of Forests in Europe (MCPFE)
- Pan-European Work Programme on the Conservation and Enhancement of Biological and Landscape Diversity in Forest Ecosystems
- Regional processes on criteria and indicators

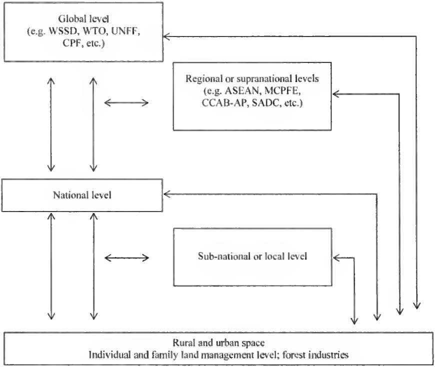
The IPF/IFF and UNFF processes: During its 1997-2000 deliberations, the International Forum on Forests (IFF) reached considerable consensus on the most important topics to be addressed by member countries and the international community. The active participation of non-governmental and indigenous peoples' organizations taking a leading role in a number of regional and global initiatives has been a strong input into the complex and sometimes controversial international dialogue. At its fourth session in 2000, IFF recommended that the Economic and Social Council (ECOSOC) and the UN General Assembly establish the United Nations Forum on Forests (UNFF). UNFF is at present the major UN political platform which integrates national governments, NGOs, the private sector and international organizations in forest-related policy discussions.

Collaborative Partnership on Forests: The Collaborative Partnership on Forests (CPF) was established in April 2001, in response to the invitation issued in the resolution of ECOSOC establishing UNFF in October 2000. CPF member organizations (CBD; CIFOR; FAO; GEF; ITTO; UNCCD; DESA; UNDP; UNEP; UNFCCC; World Bank) support UNFF in three main ways by:

- supporting the implementation of IPF/IFF proposals for action;
- providing expertise and advisory services to UNFF;
- assisting UNFF in monitoring, assessment and reporting on forests.

Regional forest-related initiatives: An important development which is complementary to the worldwide international framework is the recent initiative for more cooperation among regional groups of countries (FAO, 2001a: 110). Major issues that appear from the objectives and work programmes of the regional initiatives are a closer integration between different policies addressing natural resources utilization and environmental protection, and the promotion of a more consistent policy framework for forest conservation and the development of the forest industry sector.

Figure 1.4 - Public decision-making towards SFM at international, national and local levels


Global level
(e.g. WSSD, WTO, UNFF, CPF, etc.)
Regional or supranational levels
(e.g. ASEAN, MCPFE, CCAB-AP, SADC, etc.)
National level
Sub-national or local level
Rural and urban space
Individual and family land management level; forest industries

In *Africa* several regional initiatives have been engaged. The *Conference on Central African Moist Forest Ecosystems (CEFDHAC)* was launched in 1996 as a forum for consultation, information exchange and the strengthening of sub-regional cooperation in matters concerning Central African forests. It is essentially a process with governmental and non-governmental stakeholders. The *Yaoundé Declaration* was adopted by the summit of Central African Heads of State on the conservation and sustainable management of tropical forests in 1999. It is mainly a government-steered process aiming at actions to harmonize national policies; participation by the rural population and the private sector in decisions on forests; creation of transboundary protected areas; reduction of poaching and unsustainable exploitation; financial systems supporting SFM; and international cooperation. The *Southern African Development Community (SADC)* provides a framework for cooperation in forestry through its forestry sector policy and development strategy of 1997. SADC's forestry programme of action provides for developing and implementing regional projects focusing on forestry training and education; improved knowledge of the resource base; forestry research; forest resources management; forest industries, markets and marketing; and environmental protection.

The *Central American Council for Forests and Protected Areas (CCAB-AP)* was established in response to the Central American Agreement on Biodiversity which was signed in 1993. It acts as an advisory body of the Central American Commission on Environment and Development (CCAD) and focuses its strategic work on research and inventory of species; economically sustainable uses of forests and wildlife; valorization of environmental services; strengthening and consolidation of Central America's national systems of protected areas; promotion of co-management within protected forests and wildlife areas; studies on the agricultural frontier and on agroforestry; and promotion of a regional strategy for the prevention of forest fires. The *Treaty for Amazonian Co-operation (TCA)* fosters collaboration among member countries with regard to policies and activities in agriculture, fisheries, forestry and the environment in the Amazon watershed. Forest-related activities carried out under the treaty concern the development of common criteria and indicators for SFM; research on the potential of secondary forests within the region; and the formulation of a common strategy for the valuation of natural tropical forests as a carbon sink.

The *Association of Southeast Asian Nations (ASEAN)* implemented a strategic action plan for cooperation (1999-2004) as the first step in a long-term strategy for the food, agricultural and forest sectors. Specific forestry objectives focus on SFM; joint approaches addressing international and regional forestry issues; promotion of intra- and extra-ASEAN trade in forest products and private sector participation; increasing productivity and efficient utilization of forest products; and capacity building and human resources development. Following the large-scale fire problems of 1997, monitoring of hazards and measures to prevent forest fires have become an important part of cooperation within the region and with international partners. Other activities that have led to increased regional cooperation concern the development of common criteria and indicators for SFM; the development of comprehensive forest information databases; the establishment of a network of demonstration forests; cooperation in using geographic information systems; and the promotion of low-impact logging and modelling growth and yield in forests.

The *Ministerial Conference on the Protection of Forests in Europe (MCPFE)* involves more than 40 countries including the Russian Federation. The initiative started in 1990 with the purpose of addressing common threats to the forests in the region as well as opportunities for improvements in forest management. It consists of a series of ministerial conferences at which resolutions are adopted and mechanisms for follow-up activities defined. The third conference held in 1998 in Lisbon adopted two resolutions. The first one calls for further development of human resources through increased dialogue with the public; education and training; more involvement of women in forest-related activities; and enhancing the socio-economic functions of forests. The second one is of particular importance inasmuch as it endorses the Pan-European criteria and indicators for SFM and the Pan-European operational guidelines for sustainable forestry practices.

The work programme formulated in 1999 covers four main areas which refer to dialogue with society based on:

- public participation, public relations and education;

- socio-economic issues, in particular rural development, goods and services from renewable resources, training, education and gender issues, countries in transition;
- biological diversity and conservation, in particular biological and landscape diversity, forests and climate change, management of mountain forests; and
- planning, monitoring, evaluation and reporting, in particular as related to national forest programmes and to criteria and indicators.

The fourth ministerial conference in Vienna in 2003 follows these lines and has been placed under the title "Living forest summit – common benefits, common responsibilities". It focuses on benefits for urban societies and rural communities, building strong partnerships and tackling global challenges. An important complementary element to the activities of MCPFE is the *Pan-European Work Programme on the Conservation and Enhancement of Biological and Landscape Diversity in Forest Ecosystems.*

Regional processes on criteria and indicators: The development of a common grid of relevant criteria and indicators that can be used at eco-regional levels is an important necessity in order to assess and monitor progress in SFM at the national level as well as in response to internationally agreed commitments. A number of initiatives have been undertaken by governments, the private sector, NGOs and international institutions to develop and implement criteria and indicators for SFM at regional levels (FAO, 2001a: 116). In response to countries' demand there are at present nine such processes engaged in elaborating a common basis of understanding on what the principle of sustainable management implies in a given socio-economic and ecological context (**Box 1.7**).

Box 1.7 - International criteria and indicator processes

- ITTO criteria for sustainable management of tropical forests
- Pan-European Process on Criteria And Indicators for Sustainable Forest Management
- Montreal Process on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests Outside Europe
- Tarapoto Proposal for Criteria and Indicators for Sustainability of the Amazon Forest
- Dry-Zone Africa Process
- Near East Process
- Lepaterique Process of Central America
- Regional Initiative for Dry Forests in Asia
- African Timber Organization for the identification and testing of criteria and indicators for sustainable forest management in its member countries

International forest-related instruments

Progressive role of international forest-related instruments: The dynamic international policy processes have led to a substantial expansion of international law on environment and development and to an increasingly complex legal and political framework for forestry (FAO, 1999: 92; 2001a: 106; 2002: 272). This refers in particular to a number of international forest-related instruments adopted during and after the UNCED conference in Rio (**Box 1.8**). They encourage countries to accept a broad range of obligations aiming towards a more sustainable use of natural resources. International legal arrangements have to balance multiple and often divergent interests of governments and stakeholders. This is the case with forests and forestry, which involve environmental protection at a global scale, as much as issues of economic and social development at national and local levels.

The development of international law on environment and natural resources shows to a considerable extent soft law instruments which establish foremost enabling mechanisms for international consensus building and cooperative arrangements. They facilitate compliance with legally binding responsibilities and support countries with a lower level of advancement in certain policy areas in order to agree step-by-step on a higher level of commitment. In their initial stage soft law agreements and instruments are general in purpose, leave options with regard to the time frame for implementation and provide opportunities for countries to choose their own approach in addressing problems of common concern. One of their functions is to provide working tools flexible enough to accommodate competing interests, changing situations and evolving scientific and technical knowledge. Even if concrete results are scarce in the beginning, legal instruments facilitating a phased adoption of responsibilities can lead to substantive progress in the long run. This has been the case, for instance, with the Montreal Protocol, where a special fund was set up to finance projects addressing the reduction or phasing out of ozone depleting substances. Another example that allows for gradually increasing commitments through subsidiary instruments is the Kyoto Protocol meant to implement the convention on climate change.

Box 1.8 – International forest-related instruments and political commitments

Adopted prior to UNCED
- Convention on International Trade in Endangered Species (CITES)
- Ramsar Convention
- UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage
- ILO Convention Concerning Indigenous and Tribal Peoples in Independent Countries
- International Tropical Timber Agreement (ITTA)

Adopted at and following UNCED
- Convention on Biological Diversity (CBD)
- Convention to Combat Desertification (CCD)
- Framework Convention on Climate Change (FCCC)
- Kyoto Protocol
- Chapter 11 of Agenda 21 and the Forest Principles
- Johannesburg Declaration on Sustainable Development and Plan of Implementation of the World Summit on Sustainable Development, 2002

International instruments adopted prior to UNCED 1992: Some international instruments were adopted prior to UNCED. A common feature is that most of them originated within specialized agencies of the UN addressing particular issues and problems. They refer to specific aspects of protecting biodiversity and ecosystems such as CITES, as well as the Ramsar Convention protecting wetlands of international importance. Other agreements address cultural and social issues that need attention on a worldwide scale such as the UNESCO Convention Concerning the World Cultural and Natural Heritage and the ILO Convention Concerning Indigenous and Tribal People. The International Tropical Timber Agreement refers to trade and forest resources utilization and operates under the United Nations Conference on Trade and Development (UNCTAD).

The purpose of *CITES* is to control and limit international trade in endangered species of wild fauna and flora. However, the impact of CITES is rather limited since the convention addresses only those species that are in danger of becoming extinct, and its regulations refer only to imports and exports of such species. Endangered tree species may fall under the regulations of this convention. The *Ramsar Convention* imposes on contracting parties the obligation to formulate and implement planning in a way that ensures conservation and wise use of wetlands within their boundaries. The biological relation between wetlands and forestry ecosystems is well known. By protecting wetlands, some forestry ecosystems will also be protected. But for practical purposes, this link is only implicit, and there is nothing in this legal instrument that addresses forestry issues specifically.

The *UNESCO Convention Concerning the World Cultural and Natural Heritage* puts emphasis on the outstanding universal value from a historical, aesthetic, ethnological, anthropological, scientific, geological or natural point of view. The enabling mechanisms of this instrument facilitate the establishment of "recognized sites" and provide support under the convention. By protecting sites of universal value, the international community has to protect important forest sites, but there is nothing in the instrument that addresses forestry issues in particular.

The *Convention Concerning Indigenous and Tribal Peoples in Independent Countries* of the International Labour Organization (ILO) establishes the obligation for state organizations to develop jointly with interested peoples coordinated and systematic actions to protect the rights of indigenous peoples, and to ensure their integrity. The ILO convention contains provisions for the protection of land use rights of indigenous peoples as well as their traditional knowledge base. Such protection is an indispensable prerequisite for sustainable uses of forests owned by indigenous communities.

The *International Tropical Timber Agreement (ITTA).* ITTA of 1983 was negotiated with a limited life span under the auspices of UNCTAD and came into force in 1985. It established the International Tropical Timber Organization (ITTO) which became operational in 1987. Unlike some other commodity agreements, ITTA has no price regulation mechanisms or market intervention provisions, and accords equal importance to trade and conservation. ITTO's underlying concept is to sustainable development of tropical forests by encouraging and assisting the tropical timber industry and trade to manage and thus conserve the resource basis upon which they depend. A successor agreement to ITTA 1983 was negotiated in 1994 and came into force on 1 January 1997. The new agreement continues to focus on the world tropical timber economy. It contains broader provisions for information sharing, including non-tropical timber trade data and allows for consideration of non-tropical timber issues as they relate to tropical timber. The 1994 Agreement gives new emphasis to the policy work of ITTO. It enshrines the Year 2000 Objective and establishes the Bali Partnership Fund to assist producing member countries to sustainably manage their tropical timber producing forests.

International instruments adopted at and following UNCED 1992: UNCED 1992 dealt with environment and development from a global perspective. Three legally binding instruments, the conventions on climate change, biodiversity and combating desertification, were agreed upon during UNCED. The three conventions contain provisions that address the need for financial resources transfers in order to support the goals and activities under each convention. They emphasize the importance of research in order to understand the relevant processes and the urgency to develop and make available appropriate technologies for environmentally friendly production and consumption processes and for more efficient utilization of the natural resource base. They put considerable emphasis on the interactions between trade, environment and sustainable resources management.

The *Convention on Biological Diversity (CBD)* establishes as objectives "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the utilization of genetic resources, including by appropriate access to genetic resources and transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding". Many provisions defining the commitments of the convention are of relevance to forests, including: to develop national strategies, to undertake identification and monitoring of components of biological diversity, to establish systems of protected areas, to facilitate access to genetic resources, to provide access to technology and biotechnology, to protect the knowledge of traditional and indigenous communities, and to provide financial resources for developing countries. However, the convention does not address forestry issues in the terms set out by Chapter 11 of Agenda 21 and by the Forest Principles by taking into account the multiple roles and values of forests, and in particular their productive development potential as renewable resources. On the other hand, sustainable forestry practices and a multi-pronged approach in forest management combining different use intensities and preservation has a considerable potential for contributing to the implementation of the objectives of the biodiversity convention. This requires a comprehensive understanding of biodiversity in natural habitats, and in particular forest ecosystems, as well as in intensively managed production forests.

The *Convention to Combat Desertification (CCD)* puts emphasis on land uses, with special provisions for the problems of African countries. It refers in particular to the protection of traditional knowledge, and to trade practices that may cause desertification. As in the case of other conventions, forests are implicitly addressed by several provisions of the convention, but there is no systematic consideration of them. With regard to conserving and restoring the vegetation cover, forestry and more integrative land use and forest policies can play a significant role in reaching the objectives of the convention.

The purpose of the United Nations *Framework Convention on Climate Change (UNFCCC)* and related instruments, e.g. the Kyoto Protocol, is "the stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The convention explicitly recognises the role of forests as carbon sinks. For example, forests are an important source of carbon dioxide emissions to the atmosphere when their biomass is reduced from degradation and deforestation. In their efforts to lower greenhouse gas concentrations in the atmosphere, countries are therefore encouraged to conserve and enhance forests. The objective of stabilizing the concentration of greenhouse gases (GHG) by reducing emissions at the source and sequestering additional carbon in so-called sinks has been quantified for the industrialized countries in the 1997 *Kyoto Protocol*. The Protocol sets net emission reduction targets for these countries. Forests are of considerable importance in this context since they offer renewable energy and act as carbon sinks when their area and/or productivity increase. The Kyoto Protocol allows within certain limits and under strict conditions to offset greenhouse-gas emissions by enhancing carbon removal through afforestation, reforestation, forest management and some practices on non-forest lands. However, an industrialized country selecting forest management as an offset activity must then also account for losses of carbon from forests due to natural or anthropogenic causes within certain limits. The operational details for integrating forestry measures into climate change negotiations have been the subject of protracted and difficult negotiations. A first agreement was reached at the end of 2001 during the 7th Conference of the Parties to the UNFCCC in the Marrakech Accords. Practical methods for quantifying the contributions of forests are the topic of a work programme of the Intergovernmental Panel on Climate Change scheduled for completion at the 9th Conference of the Parties in Milan, Italy. The Kyoto Protocol and decisions related to it will have important consequences for forests and forestry.

Chapter 11 of Agenda 21 and the *Non-Legally Binding Statement of Principles for a Global Consensus on Management, Conservation and Sustainable Development of All Types of Forests (the Forest Principles)* recognize the environmental, economic and social importance of forests and forestry, and suggest a comprehensive approach in dealing with all types of forests. The text of both political commitments shows that the significance given by the international community to forests has changed in qualitative and quantitative terms. They express the political will to approach forestry issues in an integral manner recognizing the many uses and multiple values associated with forests. The principal limitation of Chapter 11 and the Forest Principles is the lack of mechanisms to arrive at practical and concrete solutions. For instance, on various occasions the texts refer to the need for additional financial resources and technologies to support developing countries in their efforts to implement sustainable forestry practices. But there is little on specific commitments to provide for financial transfers and to facilitate access to appropriate technologies. International coordination is advocated and there is strong emphasis on exchange of experience and information on global or regional forest developments. But again, mechanisms, such as a conference of the parties, are missing.

There remain at present significant gaps between the instruments on forest protection and management and the goals and obligations from the three UNCED conventions. This makes it difficult, for instance, to translate global and cross-sectoral objectives on climate change, biodiversity and combating desertification into consistent national policies on forests and SFM. One of the important tasks of UNFF at present is to act as such an intergovernmental platform which facilitates inter-sectoral coordination.

Political declaration and Plan of Implementation of the World Summit on Sustainable Development (WSSD): The political declaration and the Plan of Implementation adopted at WSSD in Johannesburg in 2002 confirm the fundamental principles of the Rio declaration and reaffirm the need for the full implementation of Agenda 21. They contain a firm commitment to the achievement of the internationally agreed development goals including those contained in the United Nations Millennium Declaration and in the outcomes of the major United Nations conferences and international agreements since 1992. The Plan of Implementation determines specific commitments and temporal and/or quantitative achievement criteria that relate to poverty eradication, access to clean drinking water, regeneration of fishery resources, biodiversity preservation, use of chemical substances and an increase in development aid. Other commitments that are of a more general nature address, for instance, the necessary change of unsustainable patterns of consumption and production, the protection and management of the natural resource base of economic and social development, the need to implement the internationally agreed measures to combat climate change and desertification, the importance of sustainable development for human health, and the importance of acknowledging specific development needs of small island developing states as well as those in Africa. A considerable number of provisions refer to means of implementation and to the institutional, political and social framework for sustainable development. A significant aspect of the WSSD Plan of Implementation is that forests and forestry be put into the broad comprehensive, coherent and largely cross-sectoral context that relates to the overall issues of economic and social development. At the same time the broad contributions of SFM are specifically acknowledged.

Supranational policies of the European Union

The European Union (EU) offers an interesting example where a supranational policy framework has gained considerable momentum and importance both for policy-making in the member countries as well as in international policy processes. With regard to forest conservation and forestry development the EU example is of particular interest inasmuch as its policy and legal framework relies increasingly on cross-sector measures (Cirelli and Schmithüsen, 2000). The supranational framework operates through Community Council regulations and decisions which are implemented by the member states either as direct EU regulations or by a transfer into and adjustment of national policies and regulations. Not having specific competencies in forestry matters, the EU has adopted numerous measures in other policy domains that have immediate and largely positive impacts on forests and forest management.

Box 1.9 – Forestry measures in EU policies

Policy domain	**Regulation**	**Forestry-related impacts**
Agriculture	*1096/88*	*Setting aside of excess agricultural land.* *Support scheme for forestry measures in agriculture.* *Financial support to afforestation costs and maintenance.* *Compensation for income losses.* *Investment and improvement of woodlands.* *National and regional multi-annual programmes*
Rural development	*1257/99*	*Structural fund with specific provisions for forestry.* *Support for the maintenance and development of economic, ecological and social forest functions.* *Funding of afforestation, harvesting and processing of forest products.* *Establishment of forestry associations.*
Nature conservation	*92/43*	*Network of protected areas (Natura 2000).*
Environment	*3528/86*	*Forest protection against atmospheric pollution.* *Forest health report based on uniform inventories.* *Support to field experiments and pilot projects.*
	2158/92	*Reduction of forest fire outbreaks.* *Funding of monitoring and information campaigns.* *Classification of risk areas and preparation of forest fire protection plans.* *Funding of uniform reporting system.*

Council Resolution of December 15, 1998 on a forest strategy for the European Union identifies, *inter alia,* as a substantial strategic element "the need to improve coordination, communication and cooperation in all policy areas with relevance to the forest sector within the Commission and between the Commission and the member states, as well as between the member states". The forest strategy is foremost a policy coordinating instrument. It identifies strategic elements for SFM, the principle of subsidiarity, participation in international processes, and the need to improve policy coordination within the Commission. The strategy stresses the need to coordinate activities between the Commission and member states and to encourage participatory approaches involving more closely NGOs. It is, however, not an instrument for arriving at a common forest policy framework to be applied in a uniform manner in the member states. Harmonization of forest laws, for instance, is only required with respect to a few issues, such as data collection, classification of roundwood, regulations concerning reproductive materials, and fire protection activities. The evolution of Community actions puts increasing emphasis on common forestry-related actions. Such actions, for instance, require member states to prepare special funding programmes, to adapt data collection procedures or to modify national policies and regulations. EU funding of forestry activities is undertaken in order to support the attainment of objectives in policy domains with important cross-sectoral linkages between forestry and other sectors (**Box 1.9**).

Financial incentives to forestry are made available under specific regulations in *agriculture* such as, for example, Council Regulation (EEC) No. 1096/88, which established a community scheme to encourage the cessation of farming by compensating farmers who set aside for a minimum of five years at least 20 percent of land in order to reduce excess agricultural production. An additional grant was allowed if such land were devoted to forestry production. Council Regulation (EEC) No. 2080/92 establishes a Community aid scheme for forestry measures in agriculture, covering both production and protection-oriented projects. The scheme comprises contributions to cover part of afforestation and maintenance costs during the first five years. Other payments are made to compensate income losses to farmers taking agricultural land out of production. In addition, investment aids for improvement of woodlands may be granted. Member states have to submit national or sub-national multi-annual programmes with specific requirements subject to approval by the Community. Zonal afforestation plans, reflecting the diversity of socio-economic and ecological conditions of agricultural structures, are accepted.

More recent policy measures of the Community's "structural funds" for the period 2000-2006 include specific provisions on silviculture. Council Regulation (EC) No. 1257/1999 considers forestry as an integral part of *rural development* and provides support for the maintenance and development of economic, ecological and social functions of forests owned by private persons or municipalities in rural areas. Measures eligible for funding include environmentally compatible afforestation, investments to improve the value of forests, and the harvesting and processing of forest products. New financial incentives are foreseen for the establishment of forest holder associations that support their members in achieving sustainable and efficient forest management. Financial contributions cover part of planting costs, maintenance costs for a period of up to five years, and compensation to farmers for loss of income during a maximum period of 20 years. A significant contribution to *nature conservation and maintaining forest biodiversity* is Council Directive (EEC) 92/43 on the conservation of natural and semi-natural habitats and wild flora and fauna (Habitat Directive). The objective of the Directive is the creation of a European network of protected areas *(Natura 2000)* to be progressively set up by the member countries.

Within the framework of trade policy, Community regulations address the processing and marketing of forestry products (Council Regulation EEC No. 867/90), the classification of roundwood (Council Directive EEC No. 68/89) and the marketing of forest reproductive material (Council Directive EEC No. 66/404). Other EU regulations refer to common standards for the collection of forestry data and the establishment of a common forestry information and communication system. The system reports on the existing situation of woodlands, developments in afforestation, and on conditions that concern harvesting, processing and marketing of forest products.

A number of forestry-related measures emanate from EU *environmental regulations*. Council Regulation (EEC) No. 3528/86 on the protection of the Community's forests against atmospheric pollution establishes a Community scheme to protect forests mainly with the objective of safeguarding the production potential in agriculture. Member states committed to forest protection may obtain financial support for preparing regular reports on forest health on the basis of inventories carried out according to comparable standards. The scheme supports field experiments and pilot projects. A committee on forest protection gives scientific and technical advice and assesses the suitability of measures proposed by member governments. Important environmental policy measures refer to combating and preventing forest fires. Council Regulation (EEC) No. 2158/92 on protection of the Community's forests against fires establishes a funding scheme for regular monitoring and information campaigns based on yearly programmes submitted to the Commission. Member states are obliged to classify their territory according to the degree of forest fire risks. In high and medium risk areas, protection plans to reduce fire risk, especially to combat the outbreak of forest fires, are to be prepared. Funding is also available for a uniform system of monitoring and reporting.

NATIONAL POLICY AND LEGAL FRAMEWORKS

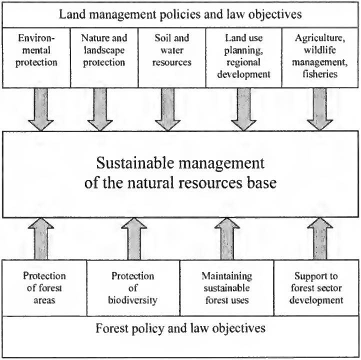
Policy networks and stages

Figure 1.5 shows a cross-sectoral policy network using, as an example, a combination of objectives addressing sustainable use of natural resources and development of rural areas. It relates the broader goals of sustainable use of natural resources and rural development to the more specific policy objectives of various policies and legislations.

The issues related to individual and collective interventions in dealing with forests and landscapes are determined by environmental and ecological potentials, risks and limitations and especially the variety and extent of the natural resource base. Environmental and ecological factors decide to which degree qualitative and quantitative needs can be fulfilled and which fundamental management options are available. Regulating mechanisms determining sustainable land use practices are social and cultural values and norms, market rules, law and jurisdiction, governmental institutions, land tenure systems, and specific rules on land management.

The actors addressed by public regulations are situated on different societal levels, with society, people and citizens as the most general one, social groups and corporative actors as agents at the intermediate level, and individuals as the actual land users, consumers, land managers and decision-makers at the level where the actual action occurs. The actors benefiting from utilizing the natural resource base exercise their influence in order to shape the conditions for managing the resources according to their needs and values. The decisions on which uses are to be promoted, which ones are acceptable, and which ones are undesirable and should be avoided are determined by many actors at different societal levels. In some cases decisions are largely left to individuals and foremost to the land users, while in others corporative actors and social groups are dominant.

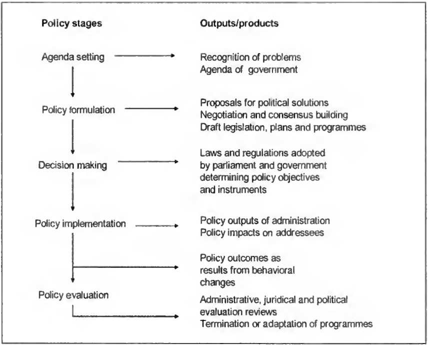
Figure 1.5 - Policy and legal network addressing natural resources development


Land management policies and law objectives
Environ-mental protection
Nature and landscape protection
Soil and water resources
Land use planning, regional development
Agriculture, wildlife management, fisheries
Sustainable management of the natural resources base
Protection of forest areas
Protection of biodiversity
Maintaining sustainable forest uses
Support to forest sector development
Forest policy and law objectives

The concept of policy cycles offers a useful approach in order to determine in which way development and implementation of policies and laws are organized. It allows for the identification of the critical paths of intervention in order to solve particular political problems through new or improved policies and legislation. The concept is based on the understanding that elaboration, adoption and implementation of policy and law follow defined stages, produce specific outputs at each stage, and show sequential structure with strong forward und backward links between the stages. **Figure 1.6** shows a sequence of five policy stages and the outputs produced. Each stage and, respectively, the relevant outputs correspond to a contextual phase of applied problem-solving (Howlett and Ramesh, 1995).

Policy development: The *agenda setting stage* addresses the need for problems to be recognized before solutions can be found. It is a process during which problems come to the attention of and onto the agenda of government. Proposals for acceptable political solutions are developed at the *policy formulation stage* based on a compilation of information, formal and informal discussions between stakeholders and interest groups, and negotiations that seek consensus leading to draft legislation, plans and programmes. The *decision-making stage* corresponds to the choice of solutions to be formally approved by parliaments, governments, and public administrations with outputs determining objectives and instruments in the form of laws, budgets or international treaties adopted by parliament; parliamentary and governmental decrees and regulations; and administrative decisions, rules and procedures.

Figure 1.6 - Five stages of the policy cycle with outputs/products


Policy stages
Outputs/products
Agenda setting
Recognition of problems
Agenda of government
Policy formulation
Proposals for political solutions
Negotiation and consensus building
Draft legislation, plans and programmes
Decision making
Laws and regulations adopted
by parliament and government
determining policy objectives
and instruments
Policy implementation
Policy outputs of administration
Policy impacts on addressees
Policy outcomes as
results from behavioral
changes
Policy evaluation
Administrative, juridical and political
evaluation reviews
Termination or adaptation of programmes

Policy implementation: During the *policy implementation stage* the adopted laws, regulations and programmes are put into effect. Implementation processes require individual and concrete decisions, as well as procedural rules and regulations (outputs) from implementing public agencies. They lead to impacts meaning concrete positive or adverse reactions on the side of the target groups to which the measures are addressed or of those actors that are incidentally affected by them. The actual policy result (outcome), i.e. the real effects of the changes, depends on the willingness or resistance of target groups to modify their behaviour. Of interest are, for instance, the outcomes of forest and other public policies that have impacts on the state and development of forests. Important effects to be observed are, for instance, the size and distribution of forest land, the stand volumes maintained, the variety of flora and fauna, and the economic and social sustainability of forestry practices.

Monitoring and evaluation: Monitoring and evaluation that allow for the assessment of the impacts of public policies and laws and the contributions that they have made in order to solve existing societal problems. Depending on positive and negative effects and on the nature of a given political problem, a policy programme may be terminated. New or additional political initiatives and incremental steps for revised and new legislation will lead to *new sequences of policy stages*.

Actor networks

One of the functions of states and governments is to participate, respectively, in organizing political networks among stakeholders, or to act as mediator between different societal actors. Network management refers to any purposeful attempt to guide political interventions and to coordinate decision-making processes among a large number of private and public actors with often controversial interests in different policy areas and at various levels of government. Managing policy networks is a difficult and complex task which often requires mediation and alternative conflict resolution techniques. Network analysis examines the consequences which follow from existing links for political steering processes. It refers to the relations between actors and stakeholders that are concerned by and/or in a position to influence political decisions. This includes, for instance, governmental agencies, private firms, private and public associations, NGOs or key persons and personal leadership.

Stakeholder networks: Stakeholder networks exist in many ways following the contextual aspects of a specific issue. In the private sector, for instance, stakeholders of an enterprise relate to the owners and investors, to the clients and the suppliers, to employees and management, and increasingly to groups interested in the implications of the entrepreneurial activities on sustainable development. In the present context relevant stakeholder groups are primarily composed of private organizations and public institutions interested in, concerned about or affected by public policies and legislation that address social and environmental problems related to the sustainable utilization of the natural resource base. Stakeholder networks focusing on forest uses and nature conservation represent, for instance, the interests of forestry production and of the wood industries, multiple use interests for other activities, nature and landscape protection interests, and local and regional interests in economic and social development (**Box 1.10**).

The conservation and development of rural space, and the increase in its production potential is the pivot and the ultimate objective of the political networks addressing sustainable uses of lands and natural resources. National regulations induced by international agreements, as well as directly applicable provisions, for instance in the case of international and multilateral projects, affect primarily individual and family land management decisions. It is largely at this level that the policy objectives have to be put into workable, socially acceptable and economically feasible programmes. The envisaged solutions are of a cross-sectoral and multisectoral nature. Issues which are at the forefront of global or supranational concerns are superposing a national and local demand. The combined effects have to be assessed in relation to specific needs and potentials. The impacts on individual and family land management decisions are incremental.

The concepts and attitudes, the behaviour and preferences, and concrete actions of private and public landowners play a key role as actors in natural resources management networks. In fact, many of the related public policy objectives as well as positive and negative cross-sectoral impacts which result from them influence strongly individual land management decisions and the behaviour of the users. Impacts of different public policies on the behaviour of forest owners and users form the primary cause-effect relation. Impact means in this context not only influences on identifiable actions but also lack of influence in orienting or changing behaviours of the target addressees. Some behaviour is particularly important to observe, such as forest clearing, timber harvesting, uses of non-wood products, utility of forest services, management practices, and biodiversity conservation and nature protection.

Box 1.10 - Examples of stakeholder networks in forestry management and nature conservation

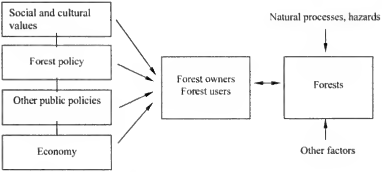
Forestry production and wood industries	*Multiple forest uses*
Forest owners' associations	Hunting and fishing associations
Forestry cooperatives	Recreation and sports associations
Forest industry associations	Tourism associations
Farmers' associations	Regional development associations
Nature and landscape conservation	*Economic and social development*
Nature protection associations	Local planning associations
Landscape protection associations	City and village councils
Environmental protection associations	Local community associations
Special forest protection associations	Citizens' associations

The behaviour of forest owners and forest users is a key determinant in evaluating the impact of public policies on the state, use and management of forests (**Figure 1.7**). The particular characteristics of the prevailing ecosystems determine to a large extent the scope of action and establish a reciprocal relationship between the state of forests and landowners and users. The state of the forest is also considerably influenced by natural processes and hazards. Socio-economic factors that influence the actions of forest owners and users are indicated on the left side of the figure. They are determined by social and cultural values, national and local economies, desired goods and services as economic outputs, and by public policies and their effects and impacts. All of these factors are interwoven with each other.

Policy instruments and financial resources

Policy instruments can be classified according to their purpose as they relate to public regulation, market intervention, market facilitation and persuasion and information (**Box 1.11**). The choice of policy instruments is currently in a process of change, putting more emphasis on financial incentives, persuasion and participatory procedures than on regulation. Labelling, for example, aims to influence the behaviour of timber customers by making the external costs of products more transparent. Voluntary agreements become more frequent between landowners and the public sector for the establishment of nature protection zones providing compensation for income losses from alternative uses. Persuasive instruments are more widely used as policy measures can be implemented more effectively if the addressees and stakeholders understand their reasons and agree with them. Regional planning and participatory decision-making are important in this context.

Figure 1.7 - Framework explaining behaviour of forest owners and users



Source: Schmithüsen, Bisang and Zimmermann, 2001: 43

A shift takes place from state control to legislation which favours new forms of joint management responsibilities involving forest owners, the private sector, NGOs and public authorities. Policies and laws set the frame determining the requirements and performance standards of the parties concerned. Procedural arrangements support the promotion of cooperative forms of decision-making and contractual arrangements with third parties. Guidelines for best management practices, procedures for mediation and the exchange of information become institutionalized. Public authorities are increasingly involved in process-steering and in implementing more comprehensive programmes of land management. Negotiated activities on a contractual basis replace direct governmental intervention. They require a more precise understanding of targets, outputs and impacts of public policies and legislation. With more attention given to collaborative policies, informational and persuasive instruments gain considerable weight. Monitoring and evaluation of concrete results combined with free access to such information ensure greater involvement of citizens and stakeholder groups in public decision-making processes.

The expanding framework of policies and laws requires a high amount of process-steering on the side of public agencies and concerted decision-making on the side of the principal users and environmental groups. This implies a shift from state control of forestry practices to legislation which favours new forms of joint management involving forest owners, NGOs and public authorities. Legislation sets a frame for defining the requirements and performance standards of the parties concerned. It supports efforts to develop cooperative forms of decision-making and contractual arrangements with third parties. Guidelines for best management practices, procedures for mediation and the exchange of information constitute a substantial part of this framework. From the viewpoint of the authorities it puts emphasis on process-steering and more comprehensive implementation programmes. It supports negotiated activities on a contractual basis and reduces direct governmental intervention.

Box 1.11 - Classification of policy instruments

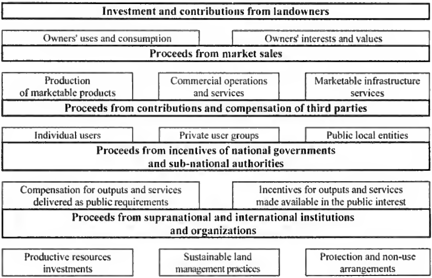
Regulative instruments	Property rights Status of forest lands Resource protection Management obligations Landowner responsibilities Planning/programming
Market intervention	Public land management Public purchases Public insurance programmes Public compensations Public incentives and grants Taxation policies Public infrastructures
Market facilitation	Marketing boards and contractual arrangements prices and tariffs Management agreements Marketing of environmental goods and services
Persuasion/information	Public education and training Dissemination of information to policy-makers and the public Extension, advice and technical assistance Information gathering and research

Source: Merlo and Paveri, 1997; Le Master *et al.*, 2002 (modified)

Sustainable use of natural resources implies that the rate of resource consumption and environmental impacts which result from it are a constitutive part of management decisions. The use of natural resources is not a mobilization of production inputs and consumption values without costs. Sustainable management practices require re-investment and new investments to maintain and increase productivity and the available resources potential. New demands from private and public stakeholders arise and lead to additional responsibilities of landowners incorporated in laws and regulations. Such developments need to be qualified in accordance with the constitutional rights of ownership. It is primarily the responsibility of the landowners to define the objectives of forest uses and to choose the management options which fit them best. It is up to them to decide to what extent they are able and willing to provide goods and services for which markets do not, or do not yet, exist. In particular, private landowners are barely in a position to carry the incremental costs of external benefits without compensation.

Financial means in managing the natural resource base derive from a variety of sources (**Figure 1.8**). Most important are the income from market sales of goods and services and the investments and financial contributions of the landowners themselves. In addition, financial resources for sustainable land development include proceeds from compensation payments of individual users, private user groups, and public local entities; from incentives of national and sub-national governments; and in certain cases from contributions of international institutions and organizations. It is important that public policies and legislation acknowledge the financial dimensions of supplying private and public goods in sustainable resources management and facilitate the sharing of financial commitments consistent with the economic realities of multiple uses.

Figure 1.8 - Financing multiple goods and services in sustainable land management.


Investment and contributions from landowners
Owners' uses and consumption
Owners' interests and values
Proceeds from market sales
Production of marketable products
Commercial operations and services
Marketable infrastructure services
Proceeds from contributions and compensation of third parties
Individual users
Private user groups
Public local entities
Proceeds from incentives of national governments and sub-national authorities
Compensation for outputs and services delivered as public requirements
Incentives for outputs and services made available in the public interest
Proceeds from supranational and international institutions and organizations
Productive resources investments
Sustainable land management practices
Protection and non-use arrangements

Instruments that favour an adequate transfer of resources commensurate with tasks and responsibilities in land management are instrumental in generating an optimal combination of private and public benefits. Developing the potential of the rural space means, in fact, facilitating the economic and social interactions between landowners, immediate beneficiaries and public entities. Policies and laws have thus to be concerned with the financing of multiple outputs and services and to determine, in accordance with the principle of subsidiarity, frame conditions for financial transactions between landowners, immediate beneficiaries and public entities.

Consistency of policy and legal networks

National forest programmes (nfps) are promoted as coordination and planning instruments at national and sub-national levels. Their purpose is to reach the goals of sustainable forest development through a holistic approach different from previous sector planning procedures. The principles for national forest programmes to be debated in Vienna in 2003 at the Ministerial Conference on the Protection of Forests in Europe show the comprehensiveness and integrative character of nfps (**Box 1.12**).

Within nfps, inter-sector approaches are seen as a necessary core element. Knowledge and experience on how to deal with cross-sector policy impacts within the framework of nfps evolve gradually. Recommendations made by FAO stipulate that such programmes need a multidisciplinary effort to become successful, that professionals in different fields and with different land use experience should be associated during their preparation, and that cross-sector linkages have to be taken into account (FAO, 1996b: 18, 31ff.). Examples of national coordination mechanisms such as high-level inter-ministerial coordinating bodies are proposed. There is need to develop effective administrative procedures, to elaborate well-structured, transparent and accessible information and databases, and to establish procedural arrangements for a continuing dialogue among stakeholders.

Box 1.12 - Principles of national forest programmes

- Participation
- Holistic and inter-sectoral approach
- Iterative process with long-term commitment
- Capacity building
- Consistency with national legislation and policies
- Integration with national sustainable development strategies
- Consistency with international commitments recognizing synergies between international forest-related initiatives and conventions
- Institutional and policy reform
- Ecosystem approach
- Partnership for implementation
- Raising awarenes

Legal networks: With regard to the functioning of legislation, general requirements to ensure consistency are: public efforts to devote sufficient resources to law implementation; anticipation of the modes and costs for effective implementation; pragmatic attitudes in evaluating real progress that can be made from newly introduced legislation; sufficient understanding and acceptance of the law by regulators and users; and appropriate judicial mechanisms to ensure law enforcement at the courts (FAO, 2002; Lindsay *et al.*, 2002). Judicial coordination ensures consistency between forestry laws and the laws that address other land uses, nature and wildlife conservation, water development and environmental protection (Knuth, 2002). Law issues that require particular attention are:

- congruence of the mandates of sectoral authorities involved;
- clear terms of reference of the concerned institutions;
- regulations that support an improvement in institutional linkages through coordination and cooperation;
- clear definition of the regulatory-making powers under the basic laws addressing the various sectors.

Issues which frequently come up in connection with the promotion of sustainable development include predictable, understandable and enforceable rules that:

- govern access to and management of public goods, such as water and other natural resources;
- address the externalities of public and private actions, including environmental, land use and public safety implications;
- regulate the activities of government officials to ensure basic limits on the exercise of discretion, and to support transparency and accountability;
- ensure rights of meaningful participation, including access to information.

Regulations may hinder sustainable development by increasing costs and creating undesirable incentives. Constraints result from bureaucratic procedures that increase transaction costs of management activities without producing corresponding public benefits. Legislation should clearly determine which agency has the power to make certain decisions. If this is not the case a key government stakeholder whose action is critical to the success of a particular strategy might find its authority to undertake that action open to challenge. Where the authority is fragmented among different sub-agencies which do not function well together, governmental action is again sub-optimal. An uncoordinated series of laws and regulations authorizes inspections of the same business, resulting in repeated and, in the end, harassing visits.

Secure rights in land, trees, water and other resources are essential for fostering investment, conservation and development. Many national legal frameworks do not, or at least not sufficiently, support sustainable access to – and provide secure rights over – such resources for rural people. In fact, some regulations curtail and even criminalize the practice of traditional rights. Sustainable development depends on effective organization and empowerment of stakeholders which involves in particular local groups for the promotion of community-based management initiatives. It is important that there be a sufficient legal basis for the creation or recognition of such institutions in which real rights, powers and responsibilities are vested.

Important criteria to assess the effectiveness of policy and legal networks in natural resources and forest management are consistency, comprehensiveness, subsidiarity and applicability **(Box 1.13).**

Measures of coordination: Coordination mechanisms and network management include several possible approaches with different policy outputs and outcomes. The following institutional aspects are relevant:

- coordinated planning and consultation procedures;
- inter-ministerial coordination mechanisms;
- establishment of public *fora* for informal or formal exchanges between different stakeholder groups;
- establishment of effective coordination procedures among public administrations;
- allocation of resources to governmental departments and units commensurate with their responsibilities and cross-sector linkages.

In order to seize potentials and boundaries of coordination, it is helpful to distinguish between positive and negative coordination (Scharpf, 1993). In positive coordination actors try to optimize the utility of all activities to be envisaged. They evaluate the options and likely commitments of other actors and parties involved and choose what they consider the optimal solution to them. A prerequisite for positive coordination is that the participating actors share a clear understanding of the advantages and disadvantages which may accrue to each party. Actors that are bound to accept disadvantages should be compensated in order to keep them as partners in longer-term cooperation. Multilateral coordination needs to be institutionalized and has to provide a guarantee that the focus is on issues of common interest that are to be negotiated. Maintaining and developing the already existing coordination and cooperation patterns is of considerable interest since the creation of new policy networks is usually quite costly.

Negative coordination on the other hand implies the reduction in the degree of inferences from one agency with the competencies of other units. A comparatively frequent case is negative coordination on a bilateral level with only two agencies or actors. It requires the precision of the responsibilities and the terms of activities of the interfering actor by limiting his sphere of intervention to his constitutional and/or administrative mandate. Negative coordination is unlikely to promote new solutions but helps to clarify the competencies of government and administration as consistent with the objectives and instruments of the prevailing public policies.

Box 1.13 - Criteria for assessing the effectiveness of policy and legal networks

Consistency: This criterion requires the compatibility of objectives and instruments with constitutional values and democratic rules, with public policies addressing land use, economic development and environmental protection, and in accordance with international commitments and multilateral agreements.

Comprehensiveness refers to the policy objectives with regard to forest protection and forestry development, to different types of forest tenures, and to the rights and responsibilities of various categories of forest owners.

Subsidiarity relates to the role of forests as national, regional and local resources as well as to the double role of forests as private production means that may be used according to the decisions of landowners, and as resources that yield numerous benefits to the community.

Applicability refers to the policy framework as a whole and to the role of public administrations. It depends on clearly established responsibilities and tasks, and on appropriate forms of participation of forest owners and interest groups in regulating forest uses and management practices. Coordination of competencies among public entities is an important aspect in evaluating the applicability of policies and regulations.

Administrative coordination is complementary to the establishment of organizational structures but cannot replace the formal distribution of competencies and resources among governmental agencies. Coordination functions well if it generates additional benefits for at least one of the involved partners. It is effective and operates smoothly if the majority of the partners, be it within the administrations or in combination with external interest groups, can rely on policy objectives and linkages with positive effects. However, one has to be aware of the limits of inter-administrative coordination, especially if important and largely controversial interests shape the content of different public policies and if cross-sector linkages have largely impeding or contradictory effects. Administrative coordination procedures have limited potential and become easily inoperable if competencies and resources are unequally distributed or if the redistribution of responsibilities and resources is at stake. In such a situation political and/or hierarchical decisions on a higher level within government are required. Decisions from outside will be more effective and enable the actors involved to develop a more rational and efficient way to coordinate various policy goals and policy instruments.

Interagency coordination: A current practice is that sector responsibilities remain with the competent government units but administrative procedures and regular meetings are institutionalized to inform, negotiate and decide on cross-sector issues (Knoepfel, 1995). An independent unit is charged to organize, moderate and mediate the meetings. A second option is to bridge the gaps between different administrations by implanting cells in other relevant departments. A forestry cell, for instance, in a land use office will be in a position to explain and advocate the rationale of requirements for sustainable forestry development. If the new procedures prove viable in the administrative environment, a review of the repartition of competencies and responsibilities may be appropriate. A third option is to handle specialized issues in a less downright manner, for example through filling vacancies with staff from other professional backgrounds. This is a rather informal but sometimes effective way to increase knowledge and understanding of the potential and requirements of cross-sector relations.

CONCLUSIONS

Important *trends* such as globalization of the economy and trade, internationalization of environmental and nature protection, privatization and a changing understanding of the role of the state, increased participation of stakeholders and the public, a growing influence of NGOs in public decisions, as well as an increase and diversification of society's demand for forest goods and services form the context in which the impacts of public policies on SFM and forest sector development have to be seen.

Public policies are based on constitutionally founded competencies of the state and on laws, decrees, governmental regulations and decisions of administrative authorities. A useful distinction may be made between policies which provide *institutional frameworks* for state intervention and public security; policies addressing *social equity, economic production and cultural integration*; and policies promoting *development for subsistence and well-being.* Specific combinations of policy domains are of importance, depending on the stage of socio-economic development, demands for goods and services, cultural values, and the area, biodiversity, productivity and fragility of forest ecosystems. In some countries and regions policies establishing an institutional framework, in others policies addressing specific economic sectors or promoting development, have been identified as being of particular relevance at present.

Cross-sector linkages between different public policies have an immediate or indirect influence on the behaviour of landowners, forest users, governmental agencies and NGOs. Of importance are the combined outcomes and results from policies and legal instruments that address economic, social and environmental issues and their *positive and negative effects* on sustainable land management practices. This refers to the positive and negative effects of *relevant policy domains* on SFM as well as to the positive and negative effects of specific *forest policies and regulations* on economic growth, biodiversity and the environment. Useful typological elements to specify cross-sectoral impacts are the combination of relevant policy domains, the regional and local socio-economic context, the levels of political decisions, the combination of policy instruments, the direction of impacts and the kind of outcomes and results that are produced.

International legal instruments adopted prior to and during UNCED, as well as the Rio follow-up processes, aim at a balance of economic, social and environmental factors as the primary objective of sustainable development. Together with continental, regional and supranational processes they establish multilevel policy and legal frameworks which increasingly influence political choices at national and sub-national levels.

At national and local levels, the *significant policy domains*, the kind of linkages that are most important and the scale of positive and negative effects which result from them need to be examined. The criterion for selecting the major factors is the usefulness of new knowledge gained to the main stakeholders, to the representatives of national public administrations and to policy-makers. The focus is on the actors involved, the instruments and procedures that influence their behaviour, and on the causal relationship between forest and other policy domains in both directions. This implies a reconsideration of the role and mandate of forest administrations and their ability to operate with success in a changing political environment in which effective stakeholder participation and a dominant role of the private sector are key determinants. Policy instruments related to process-steering, public organization and financial resources allocation gain importance.

There is need to focus on public capabilities to manage complex political *networks* with a wide range of stakeholder interests in different land use systems and management practices. It is important to find out to what extent those interests are compatible or conflicting and the reasons for both. In the case of *compatibility of interests* one has to know in which way public policies can foster synergy and optimize the available resources. In the case of *conflicting interests* one has to find out to what extent modified political solutions and regulations can be found or to what extent complementary measures and/or compensation may reduce or neutralize negative policy effects. One needs to examine more consistently how arbitration procedures among stakeholders from the private and public sector, cooperation among landowners and the industry, and mechanisms for inter-administrative coordination function in practice and what critical problems need to be solved. Useful criteria for assessing the effectiveness of policy networks and legal regulations are consistency, comprehensiveness, subsidiarity and applicability.

A considerable amount of *investigation* on cross-sectoral impacts in forestry has already been initiated, in particular by CIFOR, FAO and the World Bank but also by individual researchers and national research institutions. Further work on legal, policy and organizational issues, more explicit natural resource accounts, econometric analysis and impact will provide additional knowledge and information to policy-makers and to the public. Important is the specificity of the findings at national, sub-national and local levels providing concrete empirical information on successes as well as on gaps and drawbacks in a given social, economic and political context.

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Chapter 2

A mosaic of national and local contexts

Davide Pettenella

INTRODUCTION

This chapter summarizes main findings and conclusions of seven country case studies (Brazil, Italy, Mali, Mexico, Romania, United Republic of Tanzania and Thailand) prepared in 2001-2002 with a view to providing practical examples of cross-sectoral policy impacts in different political, legal, economic, environmental and social contexts (**Table 2.1**). **Figure 2.1** shows GDP and forest cover per capita in the selected countries. Mali and Tanzania could be classified as low income and low forest cover per capita countries; on the other hand, Mexico, Romania and Thailand are medium income and low forest cover per capita countries. Brazil is a medium income country characterized by a high forest cover per capita. Finally, Italy is to be considered as a high income and a low forest cover per capita country.

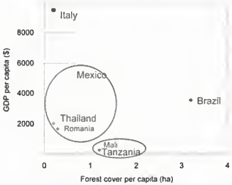
Table 2.1 - Socio-economic and biophysical characteristics

Country	Population (millions)	Rural population (%)	GDP/ capita (US$)	Life expectancy (years)	Illiteracy level (%)	Forest area (000 ha)	Annual change rate (%)	Forest protected area (% of forest area)
Brazil	168.2	19	3580	67.5	15	543905	-0.4	17
Italy	57.7	33	20160	78.4	2	10003	0.3	11
Mali	10.8	73	240	51.2	68	13186	-0.7	7
Mexico	98	26	5080	72.4	9	55205	-1.1	4
Romania	22	45	1670	69.8	2	6448	0.2	4
Tanzania	33.7	70	280	51.1	24	38811	-0.7	14
Thailand	60.7	81	2010	69.9	5	14762	-0.2	23

Sources: World Bank Development Report 2002 and FAO Forest Resources Assessment 2000.

The case studies present a diversified picture of linkages between forest and external policies. Different problems and opportunities exist in improving cross-sectoral policy formulation and coordination. The chapter is a summary review of the individual case studies elaborated by the following authors: Abrudan, 2002; Humberto and do Prado, 2002; Konaté, 2002; Mingsarn, and Rutherford, 2002; Monela, 2002; Pettenella *et al.* 2002a, 2002b; and Sosa Cedillo, 2002.

Figure 2.1 - Country GDP and forest cover per capita



The country case studies have taken different analytical approaches or focuses. Three broad categories can be identified for the sake of comparison (**Figure 2.2**):

- Some reports provide an in-depth analysis of the *problems and constraints* faced by the forest sector when confronted with macroeconomic and external sectoral policies. Other studies provide also an examination of possible ways to reduce policy failures and improve policy coordination.

- The process of decentralization and devolution is affecting almost all the countries and this may explain why some reports are considering in detail the problems of *vertical integration,* i.e. coordination among the international, national and local levels of planning. In others, attention is given to the links among policies designed and implemented at the territorial level.

- Several case studies focus on the *linkages among public policies*, while others consider the conflicting relations between market development forces and forest protection policies.

Table 2.2 shows how the attention given to institutional aspects, scale and time horizon of analysis varies among case studies.

Figure 2.2 - Main focus of cross-sectoral linkages analysis

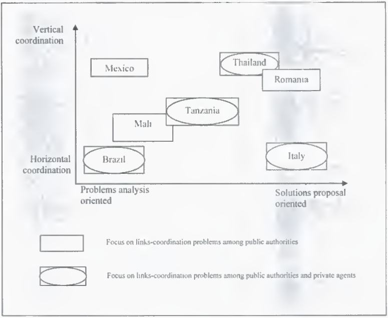
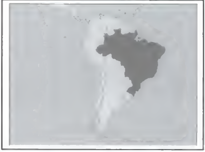

Vertical coordination
Horizontal coordination
Mexico
Thailand
Romania
Tanzania
Mali
Brazil
Italy
Problems analysis oriented
Solutions proposal oriented
Focus on links-coordination problems among public authorities
Focus on links-coordination problems among public authorities and private agents

Table 2.2 - Characteristics of country case study approach

Country	Description of national institutional setting	Local case studies	Time span considered (main focus)
Brazil	No	Yes (Amazonian region)	1980-99
Italy	Yes	Yes (three northeast mountain provinces)	1950-…
Mali	Yes	Yes (two northern and southern regions)	1985-…
Mexico	Yes (detailed)	Yes (Chihuahua State)	1995-…
Romania	Yes (detailed)	No	1990-…
Thailand	Yes	Yes (northern mountain region)	End of 1980s-…
Tanzania	No	Yes (Miombo woodlands)	1970-…

BRIEF PRESENTATION OF COUNTRY CASE STUDIES

Brazil



Brazil has the world's largest area of tropical rainforests. Forests cover around two-thirds of Brazil's land area. The country's forest classes can largely be divided into Amazon, Atlantic and araucaria forests. The humid tropical Amazon rainforests in the northwestern half of the country account for 95 percent of Brazil's forest area. The Amazon forests comprise large areas of broad-leaved forests, including those growing in a variety of dry land and alluvial zones, and lowland and sub-mountain forests. To the south of the Amazon are extensive areas of *Cerrado* (savannah-type) woodlands. Brazil has around 5 million hectares of forest plantations, based on pine and *Eucalyptus* spp., and has more than 30 million ha of protected areas including many state parks and reserves.

MAIN SOCIO-ECONOMIC INDICATORS
Population: 168.2 million
Population per sq. km: 19.9
Population growth: 1.3%
Life expectancy (1999): 67.5 years
Poverty (% population below 1$/day): 11.6%
GDP per capita: 3,580 US$
GDP: 529 4 billion US$

Brazil is the world's fifth-largest industrial wood producer and the largest producer of tropical wood. It harvests significant quantities of both hardwoods and softwoods with almost half domestic wood production being used in the sawmilling sector and a large quantity of the remainder being used to produce pulp and paper.

MAIN BIO-PHYSICAL AND FOREST INDICATORS
Surface area: 845.6 million hectares
Forest cover: 543.9 million hectares
% of land area: 64.3%
Forest area per capita: 3.2 hectares
Deforestation (annual change 1990-2000): -0.4%
Average growing stock: 131 cm/ha
Removals: 235.4 million cm
Import: 1,003 million US $
Export: 3,218 million US $

The study discusses the influences of external policies on the deforestation of the Brazilian Amazon forest through a statistical analysis of time-series data from 1980 to 1999. The following main external policies with impacts on the forest frontier are identified:

- population policy, in particular re-settlement programmes without adequate protection of indigenous people's rights;
- agriculture policy providing financial incentives for forest clearing and conversion to farmland for cattle breeding;
- infrastructure policies, in particular road construction;
- tax exemption policies for new economic activities;
- policies related to land use rights regulation.

Logging and the development of the wood industry capacity were also other important internal factors with more than 90 percent of the wood production coming from deforested areas.

Prior to the sixties, exploitation of the Amazon region involved mainly extractive goods and sparse agricultural activities. In 1966, livestock activities were encouraged in the region by governmental policies like "Operation Amazonia". During the 1970s, the federal government began ambitious programmes of road construction, mineral exploitation and expansion of crop and livestock activities on forest areas. These measures generated a process of rapid urbanization with significant migration flows from the southern parts of the country resulting in increased deforestation and forest cover degradation.

In 1988-89, important policy measures were taken by the government in the so-called "Our nature programme" to stem deforestation and to deal with related environmental issues (**Box 2.1**).

Box 2.1 – Main measures of "Our nature programme"

- Suspension of fiscal incentives of the Investment Fund for the Amazon in areas of primary tropical forest.
- Elimination of subsidies to rural agricultural credit.
- End of public investment and infrastructure programmes.
- End of the unified minimum support prices for agriculture.
- Creation of the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA).
- Creation of various "extractive reserves" and national forests.
- Obligation to register legal forest reserves of rural properties in public notaries.
- Obligation to reconstitute legal forest reserves.
- Creation of the "Operação Amazonia" programme concerned with monitoring of environmental impacts.

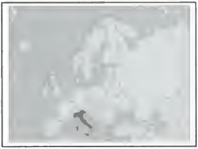
Nevertheless, the results of 1994-95 satellite monitoring of deforestation showed an increase in deforestation rates after a period of declining rates since 1990. The government then clearly recognized the need to adopt a wider set of measures and established in 1995 a "Natural resource chamber" to revise forestry policies under the coordination of the Ministry of the Environment. A "positive forestry agenda" for the Amazon was then initiated with the aim of adopting a set of pro-active and market-oriented measures towards SFM. The main measures were:

- establishment in 1995 of a "Green protocol" linking public credit lines to environmental standards;
- participation in the process of criteria and indicators for the sustainable management of the Amazon Tropical Forest (Tarapoto Process);
- establishment in 1995 (first by Government of the State of Paraná) of a "green tax" as an incentive to maintain municipal forest areas;
- provisional Measure of July 1996 modifying the Brazilian Forest Code, aiming among other things at limiting alternative use of land properties covered by forests;
- introduction of compulsory forest replacement (Normative Instruction No. 001/96 of the Ministry of the Environment);
- establishment of a new rural land property taxation considering as non-taxable areas a) permanent conservation areas, b) legal forest reserve areas and c) areas of ecological interest;

- as part of the agrarian reform policy, reduction of rural family settlements, establishment of related environmental performance indicators, prohibition of settlement in natural forest area or improved control of illegal holders of rural estates;
- organizational and administrative reform of the Ministry of the Environment in 1999, leading to the creation of the Secretariat of Biodiversity and Forests including a Forestry Directorate. Likewise a Forestry Directorate was also created in IBAMA;
- efforts towards certification of forest harvesting under the Forest Stewardship Council progressed;
- launching in April 2000 of the National Forest Programme, one of the main objectives of which was the creation of an expanded system of public conservation areas.

A system of forest concessions imposing a series of charges for harvesting in public production forests has recently been proposed by the government, with a view to making SFM more profitable or more competitive with timber from deforested areas.

Italy



Italy occupies a long peninsula stretching from the Alps into the central Mediterranean Sea with a mountainous "backbone" where the forests are mostly located. Forest and other wooded land account for less than one-third of the land area, half of which is high forest and the rest coppice often of even quality. Because of its long north-south extension and wide range of altitudes, a large variety of forest types as well as flora and fauna are found. Broadleaved species make up two thirds of the volume of growing stock, the principal species being beech, deciduous and evergreen oaks, poplars and chestnut. The main coniferous species is pine, Norway spruce and European larch. Three-fifths of the forest are available for wood supply. Two-fifths are not available, partly for conservation and partly for economic reasons. Virtually all forest is semi-natural, with some areas of plantations. Two-thirds of Italian forests are privately owned, mostly by individuals in smallholdings; one-third is publicly owned, mainly by communes and municipalities. Non-wood forest products are of importance for the rural economy. Italy is a major consumer, producer and trader of forest products in Europe. Its share of European paper and wood-based panel production is nearly 10 percent.

MAIN SOCIO-ECONOMIC INDICATORS
Population: 57.7 million
Population per sq. km: 191.5
Population growth: 0.1%
Life expectancy (1999): 78.4 years
GDP per capita: 20,160 US$
GDP: 1.1 trillion US$

MAIN BIO-PHYSICAL AND FOREST INDICATORS
Surface area: 29.4 million hectares
Forest cover: 10.0 million hectares
% of land area: 34 %
Forest area per capita: 0.2 hectares
Deforestation (annual change 1990-2000): 0.3%
Average growing stock: 145 cm/ha
Removals: 9,3 million cm
Import: 7,859 million US $
Export: 2,741 million US $

The roles of the forestry sector and related sectors' policies are compared in three northeastern mountain provinces (Bolzano, Trento and Belluno). Three key-variables are identified: policies in non-forest related sectors (in particular those of the European Union Common Agricultural Policy), land tenure systems, public administration structures and the involvement of different interest groups in the decision-making process.

According to the Constitution, regional authorities have the responsibility of policy decision-making and implementation in the agroforestry sector. During the last 25 years, the implementation of decentralization has characterized institutional changes in the forestry sector and focused efforts of the Ministry of Agriculture and Forest Policy. Limited attention has been paid to multilevel development coordination between local, national, regional (supranational) and international levels. As a result, there is no comprehensive national forest strategy clearly coordinated with other sectoral policies but a 'puzzle' of 21 different regional approaches in forest policy.

External policy influences differ from one region to the other and from one sector to the other and responses from landowners to rural development policies are strongly influenced by the prevailing patterns of land fragmentation. The land tenure regime represents a key factor for any policy related to the development of local entrepreneurship in mountain areas. The relative small size of property held by landowners represents a significant constraint on the implementation of a multifunctional and coordinated use of land resources. The establishment of minimum land areas is important to be able to implement multifunctional and coordinated management of land resources in mountain areas. It is also essential to identify niche markets and competitive advantages for the production of non-wood forest products. Vertical integration between forest land management and woodworking industry activities needs to be strengthened as well as linkages between production and consumption of local wood

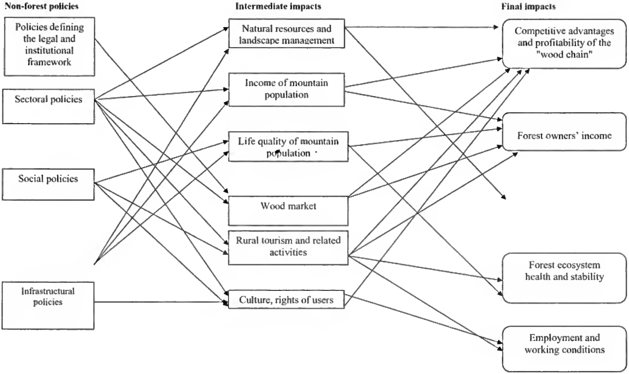
Mountain forestry activities are strategically important as they provide a number of environmental services in addition to the production of wood and other raw materials. Several stakeholders with different rights and obligations are involved in the management of forest lands. The increasing demand of society for environmental services from forests needs to be considered by land managers with the support of public authorities whenever market forces are not sufficient or adequate.

Examples of institutional arrangements to promote stakeholder involvement and coordination are presented: State-Regions Conference *(Conferenza Stato-Regioni)* for multilevel vertical coordination. As to horizontal coordination, it occurs within organizations and between different public administrations and public and private actors. An interesting example is the Forest Round Table (*Tavolo Forestale)* in Trento, where representatives of interest groups meet periodically to discuss forestry initiatives and problems at the provincial level. The Local Action Groups, co-financed by the European Commission, are another example. They were established in 1993 with the aim of channelling financial and human resources to relevant small-scale rural development investment in marginal areas. Compared with the traditional state or province-centred coordination approach, they are more open to private actors and mainly work in partnership.

Figure 2.3 showed that non-forest policies prevail and have often a greater impact on the condition and use of forests than forest policies. For example, forest management activities are very sensitive to labour policies: under conditions of full employment of local workers - as in the case study areas - forest activities can be maintained only through the employment of immigrant forest workers. However, unlike those in the agriculture sector, forest activities are very specific, highly specialized and seasonal. In order to maintain a minimum level of forest activities, improved coordination between forest policies and labour policies was recommended, including recruitment and training of an immigrant workforce.

In conclusion, local politicians and decision-makers tend to give forest resources only a marginal role. Non-forest sectors are perceived as being more important in terms of achieving a consensus among local people. In a context of full employment and no problems with importing wood raw materials, the implicit policy action is *laisser-faire*. Policy actions are limited to the implementation of rules to protect and prevent over-cutting or misuse of forest resources.

Figure 2.3 - Intermediate and final impacts of non-forest policies


Non-forest policies
Policies defining the legal and institutional framework
Sectoral policies
Social policies
Infrastructural policies
Intermediate impacts
Natural resources and landscape management
Income of mountain population
Life quality of mountain population
Wood market
Rural tourism and related activities
Culture, rights of users
Final impacts
Competitive advantages and profitability of the "wood chain"
Forest owners' income
Forest ecosystem health and stability
Employment and working conditions

Mali

Mali is lightly forested with around 11 percent forest cover and an additional 14 percent of other wooded land. Mali's vegetation types extend from Sudanian-Guinean in the south, through Sudanian and Sahelian zones, to Saharan desert occupying most of the northern half of the country. Extended drought and desertification are major problems in Mali. Closed forests are almost exclusively patches of gallery forest in riparian areas and comprise a mix of semi-deciduous forest and savannah species.

Mali's wooded areas are dominated by savannah, with *Isoberlinia doka* characterizing the Guinean-type savannah, *Parkia biglobosa* representative of Sudanian-type and *Acacia* spp. scrub representative of Sahelian vegetation.

Mali has established modest areas of plantation forest with the most common species being *Eucalyptus* spp. and *Gmelina arborea*. Mali has extensive land areas in parks and reserves.

Wood is the major fuel and energy source in Mali. There are no large-scale forest industries in the country.

MAIN SOCIO-ECONOMIC INDICATORS
Population: 10.8 million
Population per sq. km (1997): 9
Population growth: 2.9 %
Life expectancy (1998): 51.2 years
Poverty (% population below 1$/day): 72.8%
GDP per capita: 240 US$
GDP: 2.3 billion US$

MAIN BIO-PHYSICAL AND FOREST INDICATORS
Surface area: 122.0 million hectares
Forest cover: 13.1 million hectares
% of land area: 10.8 %
Forest area per capita: 1.2 hectares
Deforestation (annual change 1990-2000): -0.72%
Average growing stock: 22 cm/ha
Removals: 5.1 million cm
Import: 8.7 million US $
Export: 1.6 million US $

The case study focuses on impacts of different national development policies on the traditional forestry sector. Successful cases of sound policy implementation are examined and recommendations are made to intensify positive and minimize negative effects. Results of environmental impact assessment of three regional projects are presented **(Box 2.2)**

Forest resources in Mali are under a process of rapid degradation. The demographic pressure leading to a growing demand for fuelwood and new farmland have been identified as the two most relevant causes of deforestation. The combination of extensive agricultural methods, still in use in large areas of the country, and the lack of an appropriate policy and legal framework to protect efficiently natural resources result in their increasing depletion. Arid climate conditions affecting the country represent an important constraint to the development of the forestry sector.

The analysis of the main macroeconomic polices showed that rural development policies in combination with some fiscal measures have resulted in some indirect positive effects for the forestry sector. This is mostly due to an amelioration of the tax system and the consequent redistribution of income to the population. On the other hand, negative effects emerged such as the halt in forestry personnel recruitment and the deteriorating forest road system. Cross-sectoral issues are examined at the macroeconomic level where effects of the structural adjustments policy on rural poverty and on capacity building act as driving forces. The institutions expected to design the structural adjustments policy focus their attention on reducing the impact of development policies on poverty, mainly by improving the quantitative level of agriculture production. Little attention is given to aspects which relate to a sound overall management of natural resources. Other general programmes such as the national policy to fight poverty and the national plan for the promotion of women have had little impacts on the state and quality of forest resources. Despite a declared interest by the government to protect and develop the natural resource base of the country, (negative) effects of sectoral policies on the environment are not adequately considered. Without effective cross-sectoral development policy coordination, it is difficult for example to balance the negative effects of poverty on natural resource development. Improving agriculture practices and reducing pressure on forest resources are mentioned as two basic pre-conditions to control deforestation.

Box 2.2 - Sectoral programmes with direct effects on forest resources at local level

Natural Resource Management Project (NRMP). Results of the impact study of this project revealed positive effects on natural resources, local capacities, rural migration and the level of income. NRMP is an example of the government environmental policy implemented within the framework of the convention to combat desertification and entails three strategic components of the national forest policy: a) improvement of implementation capacity of different partners, b) identification of a sustainable resource management approach and c) conservation of biological diversity.

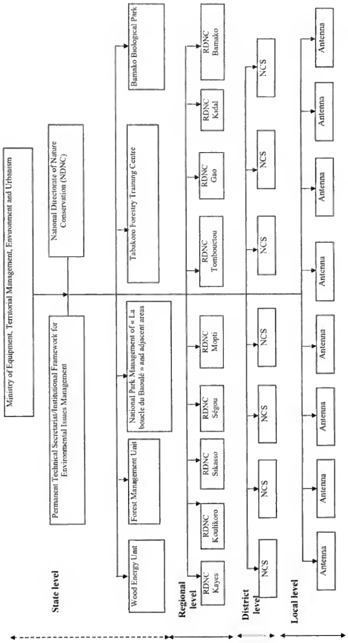
Sand Dune Fixation Project (SDFP). This project in the northern region produced good results in terms of sand dune stabilization, forest production and restoration and conservation of soil and water. It showed close linkages between the forestry and social and economic sectors in a desert environment.

Management of low grounds in the southern zone. An environmental impact study of low grounds management by the Malian Textile Company showed that in the majority of cases forest galleries along watercourses have been cleared because of their higher production potential.

Limited coordination capacity and the lack of information and participation are also important factors which limit or impede successful implementation of different sectoral strategies in the country. Decentralization with a greater involvement of local populations in the decision-making process was underlined for effective implementation of forest protection policies in particular the involvement of indigenous populations. For example, the establishment of local communal forests and the launch of environmental education campaigns have been effective ways of improving participation in SFM.

A permanent forum for analyzing and negotiating policies with impacts on forest resources has been officially proposed to improve cross-sectoral policy coordination and periodical dialogue at national level. The effective implementation of the national forest policy and involvement of the national forest administration (**Figure 2.4**) in rural development programmes was also discussed.

Figure 2.4 – National forestry sub-sector organigram


State level
Regional level
District level
Local level
Ministry of Equipment, Territorial Management, Environment and Urbanism
Permanent Technical Secretariat/Institutional Framework for Environmental Issues Management
National Directorate of Nature Conservation (NDNC)
Wood Energy Unit
Forest Management Unit
National Park Management of « La boucle du Baoulé » and adjacent areas
Tabakoro Forestry Training Centre
Bamako Biological Park
RDNC Kayes
RDNC Koulikoro
RDNC Sikasso
RDNC Ségou
RDNC Mopti
RDNC Tombouctou
RDNC Gao
RDNC Kidal
RDNC Bamako
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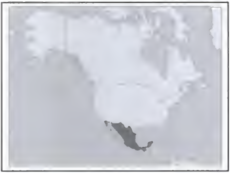
Mexico



Mexico is moderately forested with around 30 percent forest and woodland cover. It encompasses a broad range of climatic zones and these give rise to a variety of vegetation and forest types. More than 70 percent of the country is classified as semi-arid, or drier, but Mexico has also wet humid zones, as well as mountain and alpine vegetation. Lowland forest is mainly broadleaved, with significant areas of dry and arid-tropical forest and moist tropical forest on the southern Yucatan peninsula. Inland mountain regions have large areas of mixed coniferous forest, dominated by pine and fir species with a significant proportion of oak. Mexico has more than 2.5 million hectares of forest in protected areas.

MAIN SOCIO-ECONOMIC INDICATORS
Population: 98 million
Population per sq. km: 51.3
Population growth: 1.4 %
Poverty (% population below 1$/day): 15.9%
Life expectancy (1999): 72.4 years
GDP per capita: 5,080 US$
GDP: 574.5 billion US$

Mexico produces important quantities of wood and paper products, mainly for domestic consumption. The majority of the production is softwood, sawn wood and wood-based panels. Mexico's paper industry relies on secondary fibres from recycling for 80 percent of its fibre needs.

MAIN BIO-PHYSICAL AND FOREST INDICATORS
Surface area: 190.8 million hectares
Forest cover: 55.2 million hectares
% of land area: 28.9%
Forest area per capita: 0,5 hectares
Deforestation (annual change 1990-2000): -1.1%
Average growing stock 52 cm/ha
Removals: 45.7 million cm
Import: 2,728 million US $
Export: 267 million US $

The study analyses the main public policies and instruments that impact positively or negatively on the forestry sector. For example, the Programme of Sustainable Forest Development 2016 and local mechanisms of public policy coordination in the State of Chihuahua are reviewed.

Traditionally, the forestry sector in Mexico has had low priority in policy-making (e.g. a lack of fiscal and direct incentives and low public expenditure in the sector). This situation has been one of the main reasons for the absence of significant investment or interest in forest conservation and development by the sectoral stakeholders. Forest owners, the forest industry and large parts of the rural population have been negatively affected by the low political profile of the sector, in terms of the quantity and quality of services provided by forest resources. However, since 1997 public expenditure in forestry has significantly increased and the federal government initiated a programme of forest incentives to promote the sustainable management of natural forests and the development of commercial forest plantations. These incentives have produced positive impacts on the sector allowing improvement in forest management, increased wood production, training of forest owners and forest workers and creating more employment and income possibilities in forest areas.

Water supply, environmental protection and development policies are the main cross-sectoral issues identified in the study. The lack of adequate intra-sectoral and inter-sectoral public policy coordination mechanisms and legal and institutional frameworks are identified as the main causes of deforestation, forest degradation and poverty. The new federal government is putting emphasis on improving public policy coordination through presidential commissions and different sectoral agency programmes. However, in most cases adequate policy coordination does not occur because favourable preconditions or mechanisms do not exist.

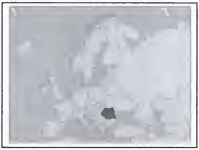
The structure of the Forestry Administration at national and regional levels is presented in **Table 2.3**. Undersecretaries, the National Institute of Ecology and the National Commission of Natural Protected Areas operate through delegations of the "Secretaría de Medio Ambiente y Recursos Naturales" (SEMARNAT) in each state. The Federal Office for Environmental Protection has its own delegations in each state. In addition, the Secretariat of Agriculture, Livestock, Rural Development, Fishing and Feeding is responsible for federal forest research and promoting commercial forest plantations.

Table 2.3 - Structure of forestry administration at national and regional levels

National agency	Main functions	Regional agencies
National Forestry Commission	To develop, favour and impel the productive activities of conservation and restoration in forest matter and in the application of the policy of sustainable forest development.	Thirteen regional management units concordant with the national division of hydrographical river basins.
National Institute of Ecology	Research on use and sustainable management of natural resources.	Delegations of SEMARNAT.
Undersecretary of Management for Environmental Protection	To execute the acts of authority in forest matter. Evaluation of the environmental and forest impacts.	Delegations of SEMARNAT in each State.
Federal Office for Environmental Protection	To watch and sanction the application of the forest and environmental laws.	Own delegations in each State.
National Commission of Natural Protected Areas	Administration of the natural protected areas at Federal level.	Through delegations of SEMARNAT.
Undersecretary of Environmental Legislation	Forest norms approval.	Delegations of SEMARNAT in each State.

In the State of Chihuahua, the Forestry Consultative Council has been a fundamental instrument for stakeholder participation and intra-sectoral coordination. Most ethnic groups in the State of Chihuahua live in forest areas. In order to improve the quality of life of ethnic groups and minimize their pressure on forest resources, better coordination of agrarian, social and sectoral initiatives are recommended. Increased resources to improve the information base on cross-sectoral linkages between forestry and other sectors, in particular with reference to the roles of civil societies and NGOs, and to create a Chihuahua State Forest Service with decentralized functions and resources fully responsible for the development of the forestry sector in coordination with the federal government, are also recommended. Finally, it is proposed that coordination mechanisms designed by the new federal government as well as coordination with the international forest policy dialogue be further strengthened.

Romania



Romania is situated on the western shore of the Black Sea. Its terrain consists mainly of rolling, fertile plains to the south and east and the Carpathian mountain range in the centre and west. Forest and other wooded land account for less than one-third of the land area, most of it located in the Carpathian mountainous region and the pre-Carpathian hills. Nine-tenths of the forest are available for wood supply and an even higher proportion is semi-natural forest, with only small areas of forest undisturbed by man. Three-fifths of the volume of growing stock are comprised of broadleaved species, mainly beech and oak. Norway spruce is the principal coniferous species. There is a wide diversity of flora and fauna in Romania's forests. Net increment, which is above the European average, has exceeded fellings by a considerable margin for some decades, leading to an increase of growing stock. Ownership of the forests was formerly entirely by the state, but the process of privatization and restitution is leading to an increase in private and community ownership.

MAIN SOCIO-ECONOMIC INDICATORS

Population: 22 million
Population per sq. km: 97
Population growth: -0.3 %
Life expectancy (1999): 69.8 years
Poverty (% population below 1$/day): 2.8%
GDP per capita (US$): 1,670
GDP (US$ millions): 36.6 billion US $

MAIN BIO-PHYSICAL AND FOREST INDICATORS

Surface area: 23.0 million hectares
Forest cover: 6.4 million hectares
% of land area: 28 %
Forest area per capita: 0.3 hectares
Deforestation (annual change 1990-2000): 0.2%
Average growing stock: 213 cm/ha
Removals: 13.1 million cm
Import: 189 million US $
Export: 516 million US $

Romanian forests provide sufficient raw material resources for the domestic industry and also for exports. There have been substantial investments in new medium-density fibre (MDF) and particleboard mills as well as in the modernization of older mills which will lead to significant increase in production in the near future.

The country case study analyses main cross-sectoral linkages in forestry which are currently driven by the processes of democratization, transition to a market economy and accession to European Union (EU). With a view to promoting coherent national policies and development planning and improving inter-sectoral collaboration, various government-level institutional mechanisms have been developed over the last decade. According to the legislation of 2001 on the organization and functioning of the government, the General Secretariat is responsible for coordinating the activities of line ministries and ensuring that the correct legal procedures are observed in the elaboration and endorsement of draft legislation. This law has improved policy coordination. The Ministries of European Integration, Public Administration and Development and Prognosis also play an important role in inter-sectoral coordination, while other ministries have cross-sectoral responsibilities. Some ministries are responsible for several sectors (e.g. agriculture, food and forests; waters and environmental protection; public works, transport and housing, etc.), while others have only one sector under their responsibility (e.g. foreign affairs; national defence; tourism, etc.) **(Table 2.4)**.

In recent years, the formulation of policy and development planning has been characterized by inter-administrative and government agency cooperation as well as by the involvement of main stakeholders, public participation and transparency. The formulation of the National Forest Policy and Strategy in 2000 is an example of open, transparent and participatory processes

Also, the ongoing restitution of forest lands to their former private, communal and institutional owners - it is expected that up to half of Romanian forests will be restored - is inducing a broad range of policy changes in the forestry sector, calling for a redefinition of the role of the state and public forest agencies, mainly the Department of Forests within the Ministry of Agriculture, Food and Forests (MAFF) and the National Forest Administration (NFA), responsible for the administration and management of state forests.

Table 2.4 - Ministerial structure of the Romanian Government, April 2002

Inter-sectoral coordination	**Cross-sectoral responsibilities**	**Multisectoral responsibilities**	**Single sector responsibilities**
- Development and prognosis - Public administration - European integration - General Secretariat of the Government* - Relations with parliament*	- Public finance - Small and medium-sized enterprises - Public information	- Work and social solidarity - Industry and resources - Agriculture, food and forests - Waters and environmental protection - Public works, transport and housing - Education and research - Public works, transport and housing - Education and research - Culture and religion - Health and family - Youth and sports - Communication and information technology	- Foreign affairs - Justice - National defence - Interior - Tourism

* Activity coordinated by a Minister (member of the Cabinet) although there is no distinct Ministry.

The decision to privatize logging and forest products industries, including retail activities, has also a significant impact on the forestry sector, especially with regard to international trade and environmental standards.

Integrating forest management and planning within the broader context of rural development, agriculture and landscape planning has become an important issue in the context of EU accession. Policies for rural sector development and for road network expansion are seen as the most influential on forest resources management. Civil society is increasingly requesting the coordination of forest policy goals with the objectives of environment, ecotourism, energy and infrastructure policies (Table 2.5).

Strengthening the Department of Forests is seen as a priority in order to increase the capacity of the forestry sector to influence political decision-making processes and macroeconomic policies that have direct impacts on forestry sector development. The impacts of other economic sectors' policies on the forestry sector could become more effective by engaging the public authority responsible for forests in the development of new relevant legislation initiated by other sectors. In the legislation development process, it is suggested that the Department of Forests enhance its collaboration and dialogue with the main forest stakeholder and interest groups in order to reflect and represent their opinions and interests adequately. It is also proposed that it increase the capacity to coordinate and monitor the development and functioning of private forest districts and to provide extension services through its territorial units in order to ensure sustainable management of private forests.

Finally, it is suggested that the role and mandate of NFA be adapted to the new privatization context enhancing its commercial role as it faces competition from the private sector and that the National Association of Private Forest Owners, an association established in 1998 to represent all private forest owners, be supported in fulfilling its role of services provider to new forest owners. For example, the development of appropriate regulations (and their enforcement), financial mechanisms and alternative income-generating activities in rural areas as well as public awareness campaigns on sustainable management and conservation of forest resources are potential ways of maintaining the ecological functions of the restored forests.

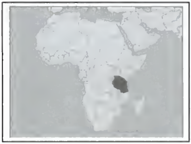
Table 2.5 - Public policy impacts on forestry sector development

Public policy domain	**Impact**	
	Main direction[a]	**Impact scale**[b]
Public policies establishing the institutional framework:		
- Economic growth	Forest policy impacted	***
- Privatization	Forest policy impacted	****
- Public finance	Forest policy impacted	***
- Employment	Forest policy impacted	**
- Rural development and land use planning	Reciprocal links	**
Public policies related to specific economic sectors:		
- Agriculture and game management	Forest policy impacted	***
- Wood harvesting, transport and processing	Reciprocal links	****
- Mining and energy	Forest policy impacted	**
- Infrastructure	Forest policy impacted	**
- Tourism	Reciprocal links	***
Public policies promoting development:		
- Environmental protection and water management	Reciprocal links	****
- Nature conservation	Reciprocal links	***
- Education and research	Forest policy impacted	**

[a] Possible direction: Forest policy is interfered with; Reciprocal link; Forest policy is interfering.

[b] On a scale from (* = little impact) to (**** = very significant impact).

United Republic of Tanzania



Tanzania has around 44 percent forest cover and an additional area of other wooded land. Tanzania has relatively small areas of closed forest with the bulk of these being mountain or sub-mountain forests. Lowland closed forests are generally semi-deciduous secondary forest, bamboo or mangroves. Open forests are much more extensive with "miombo" woodland being the predominant type. The extensive Itigi thicket comprises a large area of shrubland on the central plateau.

MAIN SOCIO-ECONOMIC INDICATORS
Population: 33.7 million
Population per sq. km (1997): 38
Population growth: 2 %
Life expectancy (1999): 51.1 years
Poverty (% population below 1$/day): 19.9%
GDP per capita: 280 US$
GDP: 9.3 billion US$

Tanzania has established significant areas of plantation forest with *Pinus* spp. and *Cupressus lusitanica*. It has an extensive network of national parks, game reserves and game controlled areas. Around 15 percent of Tanzania's forests are inside protected areas.

Most wood harvested in the country is used for fuel. Tanzania produces sawn wood, softwood pulp and paper from local raw material. The bulk of the industrial roundwood harvest is utilized for posts, poles and other agricultural purposes.

MAIN BIO-PHYSICAL AND FOREST INDICATORS
Surface area: 88.3 million hectares
Forest cover: 38.8 million hectares
% of land area: 43.9%
Forest area per capita: 1.2 hectares
Deforestation (annual change 1990-2000): - 0.2%
Average growing stock: 43 cm/ha
Removals: 23.1 million cm
Import: 9.9 million US $
Export: 5.3 million US $

The study describes recent macroeconomic policy changes, the national poverty eradication strategy and decentralization and privatization processes as they influence forestry sector development. Specific policy options and institutional arrangements are discussed in relation to SFM.

The major sectoral policies that have a bearing on forestry include those relating to the environment, livestock, energy, beekeeping, wildlife, minerals, agriculture, water, health and gender. A number of cross-cutting issues among these policies have implications on the sustainable management of forest resources (**Table 2.6**).

The Ministry of Natural Resources and Tourism is responsible for forestry, beekeeping, fisheries and game. The government's current administrative and political decentralization policy has had two main effects. At the ministerial level, the roles and functions of ministries now focus mainly on policy formulation, monitoring and evaluation and regulation. At the regional level, the main feature of the new set-up is the establishment of a team of sector experts who form the regional secretariat. Regional secretariats are to provide support to local government authorities and other stakeholders, advise the regional consultative councils and develop inter-sectoral collaboration and coordination in order to improve rational resource utilization and efficiency.

The main reasons for deforestation relate to poverty and arise from attempts to meet basic needs. They include clearing for agriculture, overgrazing, wildfires, charcoal burning and overexploitation of wood resources. The consequences have been a loss of biodiversity and a general decline in forest products and services, such as fuelwood and water catchment protection. The integration of the national economy into the world market and the intensification of agriculture to meet new market demands for export crops, have also contributed to an accelerated conversion of woodland areas to crops and pasturelands. In addition, the sudden and large-scale inflow of refugees into border districts has created major ecological, social and environmental problems.

Table 2.6 - Important cross-sectoral issues and implications

Cross-sectoral issues	**Implications**
Environment o Environmental degradation o Degradation of land, water and vegetation o Conserving and enhancing biodiversity of unique ecosystems o Improving the degraded areas	o Environmental consideration in all land and forest development activities o Closer coordination and cooperation in the environment agenda at the local, national, regional and global levels
Energy o Ensuring environmentally sustainable energy supply o Promotion and dissemination of affordable energy technologies	o Expanded supply of wood fuel o Availability of alternative sources of energy supply o Reduction in forest loss for wood fuel, sustainable utilization
Agriculture o Deforestation related to agriculture o Non-harmonized extension services o Conflicting land use planning	o Improved agricultural production through coordinated extension service and integrated land use o Enhanced food security
Health o Collaborative management of sites of useful species and research on the usefulness of plant species	o Increasing utilization of plant species in medicine from biodiversity conservation
Land o Land tenure, ownership and land-use conflicts versus SFM o Land use planning for forest development activities	o Participatory land use planning o Definition of ownership and tenure rights o Close collaboration and coordination in land development activities o Demarcation of forest land to facilitate operations of the private sector and specialized agencies
Mineral o Conflicts related to land use o Environmental conservation with respect to mineral sector development	o Reduction in conflicts related to land use for mining activities o More environmentally friendly technologies applied
Water o Conflicting interests in water resources management	o Participatory management of watersheds through reduction of conflicts
Wildlife o Conflicting interests in land use and fragmented institutional framework	o Harmonizing conflicts in land use, wildlife and forest areas o Improved coordination in management of overlapping forest/wildlife interests o Sustainable management of wildlife/forest biodiversity
Gender o Increased desertification caused by unsustainable utilization of forests and environmental degradation	o Poor crop yields, increased workload and women walking longer distances to fetch fuelwood and water

The Government of Tanzania has attempted to curb the problem of deforestation and forest degradation by promoting village and community forestry with the objective of self-sufficiency. Despite these efforts, environmental degradation continues at a fast rate.

Policy options available to the country and discussed in the case study are:

- encouragement of private sector participation;
- expansion into international markets;
- investment in health and education;
- investment in capital and infrastructure;
- improvement of economic management through the market economy;
- facilitation of devolution and empowerment policy to local governments;
- promotion of gender balance and addressing inequality across all frontiers;
- support to poor people's social capital;
- prevention of civil conflict.

These policy options have been operated through the implementation of a number of institutional reforms, including: revision of the national forest policy; revision of the forest legislation; a national forestry programme (nfp) strategy; community-based forest management; development of best practices for SFM; and development of national criteria and indicators (C&I) for SFM. In addition, the drive has been to privatize most government-owned enterprises. Positive results have become evident in most of the privatized ventures as output has improved.

The case study recommended that policies and rules governing land use and tenure be reviewed; that the legal basis on which village surveying, demarcation and titling takes place be stipulated in order to ensure recognized systems for the resolution of disputes over place and access; that nfp information be disseminated and that the start-up of district nfp planning and implementation be promoted; and that capacity building through training and education in local governments and in the private sector to which management is being transferred be reinforced.

Thailand

Thailand is today moderately forested and its forest cover has roughly halved since 1960. It has at present slightly less than 30 percent forest cover. Most of the forests are restricted to relatively inaccessible mountainous areas. The main forest types are evergreen mountain rain forest, mixed deciduous monsoon forest and open dry dipterocarp and savannah forests. Teak (*Tectona grandis*) has generally been the most important timber species.

MAIN SOCIO-ECONOMIC INDICATORS
Population: 60.7 million
Population per sq. km: 118.9
Population growth: 0.8 %
Life expectancy (1999): 69.9 years
Poverty (% population below 1$/day): 2.0%
GDP per capita: 2,010 US$
GDP: 121.9 billion US$

Since 1989, Thailand has had a ban on all logging in natural forests and has implemented a series of supporting measures to protect the remaining forests and to promote private sector involvement in forest management and plantations. It has more than half a million hectares of plantation forests. A network of parks and reserves encompasses more than 10 percent of the total land area.

Thailand's primary sources of industrial wood are plantation forests, non-forest trees, agricultural tree crops (particularly rubber wood) and imports. The country produces significant quantities of sawn timber, wood-based panels and paper. Furniture manufacturing is an increasingly important industry. Imports of logs, sawn wood, short- and long-fibre pulp and recovered paper are important constituents of Thailand's wood processing sector.

MAIN BIO-PHYSICAL AND FOREST INDICATORS
Surface area: 51.3 million hectares
Forest cover: 14.7 million hectares
% of land area: 28.9%
Forest area per capita: 0.2 hectares
Deforestation (annual change 1990-2000): - 0.7%
Average growing stock: 17 cm/ha
Removals: 23.4 million cm
Import: 1,323 million US $
Export: 855 million US $

The study addresses the institutional web of pressures and influences that are at work in the continuing transformation of patterns of livelihood and land use in the rugged and multicultural Thai uplands. Population expansion, state enclosure of forests and competing land claims by diverse stakeholders have created strong interlinks and conflicts between the upland and lowland zones. Key sectors considered are forestry, national security, agriculture and tourism. Highland development projects in northern Thailand have contributed to the integration of remote and semi-subsistence-based mountain villages into a rapidly changing regional, national and global economic environment. The consequences of these changes on mountain communities and the biophysical environment have been profound.

Most relevant cross-sectoral issues discussed are the following:

- expansion of the highland population, with an increasing land scarcity as ethnic minority groups, originally from China, have come into conflict with long established local communities;
- increased presence of lowland farmers and investors in mountain areas;
- establishment of forest enclosures by the state authorities, nominally for conservation of forest resources, with a huge expansion of national parks, wildlife sanctuaries and watershed protection zones;
- reduced forest land availability, also as a consequence of forest enclosures;
- decreased fallow length and related problems of soil fertility loss and food insecurity;
- opium cultivation eradication policies balanced by a plethora of government, bilateral and international highland development projects for crop replacement.

As regards mountain development, an integrated community approach was promoted in the 1990s as a means to stop deforestation and to improve the standard of living of the people who depend on the forests. Conflicts over forest between people and the state, and among people over water usage, often arise. Conflicts over forests involve state policies and actions limiting local access and increasingly assertive villagers demanding rights to land and natural resources. The ninth Development Plan and the 1992 National Environmental Quality Enhancement Act have been prepared by convening meetings with different interest groups and stakeholders in every region of the country, including representatives of the grassroots, and have been hailed as being people-centred. It has therefore become a synthesized aspiration of the multistakeholders even if it is considered as lacking prioritization of strategies, programmes or projects.

The emergence of state and local cooperation is seen as the key to answering environmental and social problems in the uplands of Thailand. Decentralization supported by civil societies was a major theme in the 1997 constitution. Nevertheless, the effectiveness of the new *Tambon* Administrative Organizations (TAO) in devolving power to the grassroots and, most significant for upland areas, giving local people a voice in the management of natural resources, is still controversial. The lack of personnel, monitoring capacity and people's participation in the management of local resources means that important natural resources continue to remain under *de facto* if not *de jure* open access. This has clearly led to the abuse of forest, water and aquatic resources.

The study concludes that the current command-and-control philosophy of Thai natural resources administrations **(Table 2.7)** still tends to implement policies that ignore the potential of mountain communities to work towards sustainable development. They preclude many potential options for sustainable development. The authors recommended that policies be adopted that link land tenure with sustainable land use, promote human security and encourage collaborative activities and research among diverse stakeholders like villagers, academics, state authorities and NGOs.

Table 2.7 - Government agencies with environmental management responsibilities

Ministry-level agencies	Total number of agencies			Number of agencies with environmental-management responsibilities		
	Department/Office	State enterprise	Total	Department/Office	State enterprise	Total
Prime Minister's Office	21	7	28	8	4	12
Defence	6	3	9	1	-	1
Finance	7	9	16	3	-	3
Foreign	12	-	12	1	-	1
Agriculture and cooperatives	12	7	19	10	2	12
Transport and communications	8	11	19	4	2	6
Commerce	8	1	9	3	-	3
Interior	9	7	16	8	4	12
Justice	9	-	9	-	-	0
Labour and social welfare	6	-	6	1	-	1
Science, technology and environment	8	2	10	8	2	12
Education	14	2	16	3	-	3
Public Health	7	1	8	6	-	6
Industry	6	3	9	2	2	4
University Affairs	21	-	21	-	-	0
Total	**154**	**53**	**207**	**58**	**16**	**74**

Source: Office of Environmental Policy and Planning, 2001.

LESSONS LEARNT

Institutional weaknesses in the forestry sector and a too marginal role in public decision-making processes related to macroeconomic and rural development policies were identified as the most common elements mentioned in all case studies. These problems cannot be solved by trying to protect and isolate the forestry sector. On the contrary, there is an urgent need to look for better recognition of the significant economic and social values of forest resources and their role in the sustainable well-being of communities.

The country case studies also unveiled two important aspects of cross-sectoral policy impacts: the level of policy decision-making and the type of institutional coordination mechanisms or approaches. Concerning the level of policy decision-making, a distinction can be made between international, regional (e.g. the Council of Europe, the Ministerial Conference on the Protection of Forests in Europe or area free trade agreements), national and sub-national or local political arenas. Three levels of coordination may be defined:

- inter-sectoral (or horizontal) coordination, when problems are considered mainly at the same territorial level by actors operating in different sectors,
- infra-sectoral (or vertical) coordination, when coordination is based mainly on interactions among actors operating at different levels but in the same sector, and
- multilevel cross-sectoral coordination, linking international and national efforts.

Public involvement in forestry policy coordination takes different forms according to socio-economic and institutional contexts (**Table 2.8**):

Forest policies, programmes and plans. These processes introduce public involvement at an early stage of decision-making in order to anticipate conflicts and to enhance transparency and social acceptance of policies, strategies or plans. Their implementation is largely the task of national or regional forest services but others actors have increasingly an important role to play.

Promotion of public involvement in specific forest projects. Public participation aims at promoting or increasing direct public involvement of stakeholders in the implementation of specific forest projects as, for instance, the creation of urban green spaces, afforestation projects and the prevention of forest fires.

Public auditing of forestry projects and practices. Public participatory processes refer to formal procedures of public consultation about specific practices or projects, e.g. environmental/social impact assessments. They are often based on legal requirements but also result from voluntary codes of practice.

Advisory boards/council for public advice or management of conflicts. Advisory boards or councils are permanent *fora* that help the public to be better informed and to have a more direct influence in forestry-related matters. They group various – mainly organized – interest groups and can be found at different political levels.

Table 2.8 – Types of public involvement in forestry policy coordination

	1. Forest policies, programmes, plans	**2. Promotion of specific projects**	**3. Public audits of projects/practices**	**4. Advisory boards/permanent councils**
National level	-National forest programmes or strategies -Definition of national sustainable forest management standards -Forest Council -Framework for public involvement in forest management	-Forest education and awareness raising projects	-Environmental or/and social impact assessment -Nature complaints boards -Public audits of private enterprises -Citizens' juries	-Forest council and advisory boards or commissions -Round table with forest industry, environmental groups -User Councils
Sub-national level	-Longer term regional forest or natural resources planning -Landscape ecosystem level planning	- Planning and implementation of afforestation programmes/projects		-Regional forestry commissions -Permanent advisory councils
Local level	- Management planning at forest unit level -Nature protection and recreation planning -Real estate planning -Management of community woodlands -City and communal land and forest use practices	- Groups of private forest owners - Regulation for forest contractors/merchants - Creation of new forest zones in urban areas - Partnership for the provision of local amenities - Prevention of forest fires - Community-based forestry schemes	-Allocation of public grants and subsidies for specific forestry operations	-Partnership with users' organizations - Community based management

Source: International Labour Organization (2000)

There is need for pragmatic stages, whether legislative, strategic or operational, to determine in which manner the involvement of stakeholders can be ensured. The degree of involvement may range from exchange of information, consultation and joint decision-making to full public participation in forestry decision-making. Public participation processes are dynamic and change from one process to another over time. Some are short-lived; others turn into more permanent arrangements.

The institutional levels, stages in decision-making or implementation and intensity of public participation processes depend on the issues, the objectives of the initiators and participants and on the cultural, political and institutional context. Most case studies focused the analysis at the level of infra-sectoral or multilevel cross-sectoral coordination problems, mainly with reference to the process of decentralization and devolution.

As regards institutional coordination mechanisms, five approaches have been singled out which are not necessarily mutually exclusive:

- *market*, where decisions related to resources allocation are based on the price system i.e. on financial costs and revenues deriving from various economic activities;
- *hierarchy*, where a responsible organization or authority defines the main lines of policy, establishes priorities and is responsible for inter- and infra-sectoral decision-making;
- *"comitology"*, where joint committees, project teams or expert groups - whose members are expected to be representative of different stakeholders – are responsible for negotiating internally the matters related to coordination problems;
- *participation*, where the concerned stakeholders, comprehensively involved, are given formally or informally the responsibilities in negotiating and implementing policies;
- *institutional coordination*, where formal rules/responsibilities are defined in order to prevent overlapping and interference among actors.

Table 2.9 summarizes coordination mechanisms and presents some of their advantages and disadvantages.

Table 2.9 – Advantages and disadvantages of coordination mechanisms

Mechanism	Advantage	Disadvantage	Country example
Market	No public transaction costs. All actors involved.	Exclusive of non-market benefits.	Brazil: "Green Protocol" linking public credit lines to environmental standards
Hierarchy	Rapidity and cost effectiveness	Limited stakeholder support and transparency.	Tanzania: Regional secretariats
Comitology*	Integration of different competences/interests and cost effectiveness	Limited representativeness and transparency.	Romania: Ministry of European Integration
Participation	All actors are involved in negotiated solutions	High cost and lengthy process	Italy: Local Action Groups co-financed by the EC and involving private and public stakeholders
Institutional coordination	Transparent and clearly defined responsibilities. Limited costs.	Do not always prevent or reduce conflicts and needs for coordination	Thailand: *Tambon* administrative organizations

* Comitology is the coordination mechanism used by the European Commission to implement legislation at the European Community level. Each legislative instrument specifies the scope of the implementing powers granted to the Commission and how the Commission is to use them. In practice, the Commission is assisted by a committee in accordance with a procedure known as "comitology". The committees consist of representatives from Member States and are chaired by the Commission. They enable the Commission to establish a dialogue with national administrations before adopting implementing measures.

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Chapter 3

Economic considerations on instruments and institutions

William F. Hyde

INTRODUCTION

This chapter reviews the policy instruments and institutions affecting the production of both commodity and non-commodity outputs of forests. We want to account for interactions between market and non-market valued forest resources, such as timber harvests that damage critical habitat for resources like biodiversity, and also interactions between activities in other, non-forest, sectors of the economy that influence the non-commodity and non-market products of the forest. The conversion of forest land to agricultural production is the common example, but activities in other sectors that indirectly affect the forest through their influences on timber harvests and agricultural land conversion can also have important effects on the non-market outputs of the forest.

We are interested in the policy instruments and institutional mechanisms that reinforce the favourable interactions or mitigate the effects of negative interactions - including both instruments and institutional mechanisms that affect forestry directly and those that create spillover effects from other sectors of the economy. The source of our interest is the increasing global concern for long-term sustainable resource use and the recognition that changing demands over time (and with economic development) increase the importance of maintaining all future options for resource use. With changing demands, some resources that were previously unknown or of low value take on new and greater value. Therefore, long-term sustainability requires that we protect the future availability of all resources. Those resources that have little or no current market value and those that are easily affected by inadvertent spillovers from other sectors of the economy are often the easiest to overlook and the most difficult to protect for future generations.

Unfortunately, forests and forestry occur at the margin of most other economic activity and many forest resources and forest-based environmental services are low-valued and dispersed. This means they are easily affected by inadvertent spillovers from macroeconomic planning, from institutional change and from activities in higher-valued geographically adjacent sectors like agriculture. Furthermore, monitoring and enforcement to restrict undesirable activity in the forest is expensive relative to the values at risk - because forest resources are often dispersed and undetected access to them is often very easy. Nevertheless, undeveloped natural forests are the only remaining sources of some fundamental resources and the social valuation of some of these apparently grows with time and with economic development. Therefore, our vigilance in protecting the forest from inadvertent spillovers is both difficult now and critical for future social well-being.

The consensus opinion seems to be that spillover effects in general have important negative effects on the forest. However, the magnitudes of these effects have seldom been measured and there are mixed opinions, for example, regarding the potentially negative effects of agricultural policy or the potentially more favourable effects of transfers of forest management from state to local institutions. Furthermore, those few attempts to quantify spillover effects on the forest have generally focused on the entire forest. They do not usually consider differential local impacts on the specific non-commodity and non-market forest products and forest resource services. It is important that we take those differential effects into account in this chapter.

The chapter is divided into four basic sections. The first introduces a forest organization or taxonomy that features three characteristics - location, labour (a variable that is related to population for some economic assessments) and local institutions - that determine which forest areas are the sources of most forest resource uses and, therefore, which forest areas are under greater risk and are of greater importance for immediate policy action. The second section incorporates this taxonomy in a discussion of taxes, incentives and regulations that alter the different forested areas and their important commodity and non-commodity outputs. The third section considers adjacent sectoral policy and institutional spillover effects including infrastructure and property rights. The fourth section of the chapter discusses five key forest products and environmental services.

Conclusions summarize those policies and institutions that are most effective in mitigating negative or enhancing positive effects on the commodity, non-commodity and non-market values of the global forest. Various selective policies can have favourable consequences for the protection of particular forest resources. However, the discussion in this final section notes that the general problem of rural poverty may be the greatest source of deforestation and loss of the various non-market valued forest resources. Therefore, general economic development may have a greater positive effect on the protection of these resources than any set of selective and specific policy or institutional improvements. As a corollary, policies that are detrimental to the rural poor may have the greatest negative influences.

A TAXONOMY OF FOREST DEVELOPMENT

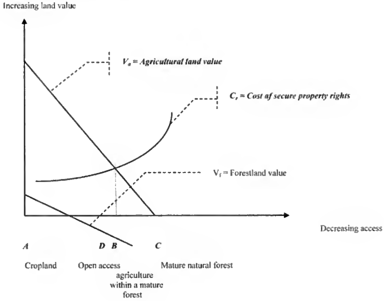
This section reviews the fundamental market economic characteristics of the forest and develops an organization for identifying the most likely spillover effects from other sectors of the economy. This organization is also useful for discussing the non-market values of forests, as it assists in judging where non-market values are under greatest risk - as well as for identifying the source of risk and the means for its mitigation.

Consider how economic activity in general affects the structure of forests. A common pattern emerges from observations taken almost anywhere around the world. This is a pattern of new settlement, followed by deforestation and increasing scarcity of forest products eventually combined with regional development, rising prices and the forest investment that limits further depletion of the remaining natural forest. This pattern describes development of any region over time, but it also describes a cross-section of the world today. All regions of the world fit within one stage or another in this pattern. Indeed, many countries contain regions that fit into different stages of the pattern, with some of their regions containing only natural forests on the frontier of economic development while other regions of the same country may contain aggressively managed modern forest plantations.

Figures 3.1-3.3 capture the basic elements of this pattern. They conform to the general pattern of economic geography first proposed by von Thunen in the nineteenth century. They also provide the key reference points necessary for further reflection on investment timing, institutional constraints and the markets and policies affecting forest products and their values.

A new frontier, stage I: **Figure 3.1** describes a simple landscape of agriculture and forests at the time of the first permanent settlement. New settlement is generally associated with a level of agricultural use. The value of agricultural land is a function of the net farmgate price of agricultural products - which is greatest when the farmgate is nearer the local market at point A. Land value in agricultural use declines with more limited access (which is closely related to increasing distance) as described by the function V_a. That is, the periodic crop value per hectare minus the costs of growing that crop creates a net value function that declines as we move to less and less accessible land farther and farther from the value centre at A. Households and communities absorb a transactions cost C_r for establishing and maintaining secure rights to this land. This is not a part of the net value calculation represented by V_a. This transactions cost increases as the levels of public infrastructure and effective control decline and the cost of excluding trespassers increases as we move farther and farther from the value centre at A.

Figure 3.1 - A new frontier, stage I


Increasing land value
V_a = Agricultural land value
C_r = Cost of secure property rights
V_f = Forestland value
Decreasing access
A
D
B
C
Cropland
Open access agriculture within a mature forest
Mature natural forest

The functions explaining agricultural land value and the cost of secure property rights intersect at point B. Farmers manage land between points A and B for permanent and sustainable agricultural activities. They use land between points B and C (where agricultural land value declines to zero) as an open access resource to be exploited for short-term advantage. Local households and communities may protect some lands beyond point B to a limited degree – such as having children shepherd their grazing livestock. Nevertheless, transactions costs C_r continue to rise after point B until eventually no reasonable number of shepherds or other resource guards can fully exclude illegal loggers and other open access users of remote forests.

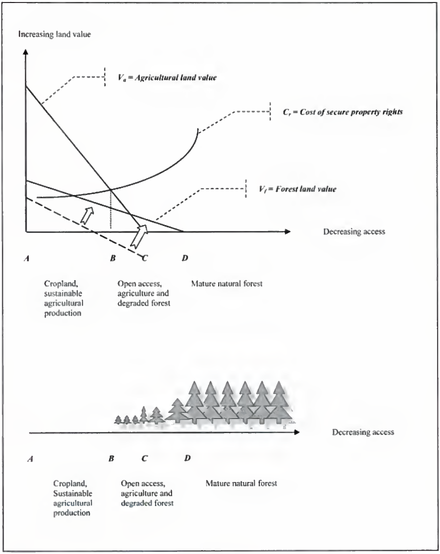
Local consumers harvest the products that grow naturally in this region between B and C, crops like fodder for their grazing animals, native fruits and nuts and fugitive resources like wildlife. They will not invest even in modest land improvements in the region between B and C because the costs of protecting their investments would be greater than the return on these investments. Their use of this open access region is unsustainable except for periodic removals from pulses of naturally growing vegetation.

At the time of initial settlement, the mature natural forest at the frontier of agricultural development at point B has a negative value because it gets in the way of agricultural production and its removal is costly. The first settlers remove trees whenever the agricultural value of converted forest plus the value of the trees in consumption exceeds the cost of their removal. In fact, farmers in some frontier settlements farm in and around the trees they have not yet removed in preference to absorbing the costs of removal. Therefore, the function V_f describing forest value must begin below the agricultural value gradient V_a and, in this initial stage of development, it does not extend as far as the intersection of the agricultural value gradient with the horizontal axis.

A developing frontier, stage II: Both market and subsistence household demands justify the removal of some forest products and they will continue to justify additional removal at each new moment in time. Therefore, the forest frontier must gradually shift outward. The most accessible forest resources are always removed first. This is true whether those resources are timber, fuelwood, bamboo, fruits, nuts, latex, or whatever. The forest value gradient continues to shift upward and outward over time until it intersects the horizontal axis at some point like D in **Figure 3.2**. The price of the forest product in the market at A is now just equal to the sum of its cost of removal plus its delivery to the market. Products will be removed until their in situ value at point D is zero. Therefore, the value of forest land at D is also zero. The area of unsustainable open access activities now extends from point B out to points C or D, whichever is farther. The costs of obtaining and protecting property rights ensure that the resources within the area described by BD will remain open access resources.

Forest degradation, a feature of the open access region: The area of open access will not be fully deforested. Rather, the forest on these lands will be degraded to the level where the expected return from lower quality products is equal to the opportunity cost of the labour and capital used in their extraction. The picture below Figure 3.2 illustrates the effect on the forest. The remaining degraded resource tends to be larger and the forest is more fully stocked (degradation is less) at point D than at point B because the opportunity costs of labour and capital used in resource extraction are higher at the greater distance represented by point D.

Figure 3.2 - A developing frontier, stage II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Mature natural forest
Decreasing access
A
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C
D
Cropland, Sustainable agricultural production
Open access, agriculture and degraded forest
Mature natural forest

These opportunity costs are important explanatory factors for the levels of deforestation and forest degradation. We can anticipate that both the extent of deforestation and the severity of forest degradation are greater in markets where the opportunity costs of extraction are smaller. Consider two regions that are similar in agricultural and forest values, in applications of property rights and in forest characteristics. They differ only in the opportunity costs of extraction from the forest. Loggers and harvesters of other forest resources extract from the forest out to the point where their compensation equals their opportunity cost. The lower their opportunity costs, the farther they are willing to go to extract products of the same value. Therefore, the forest value gradient in the higher wage and capital cost market will intersect the horizontal axis closer to the market at point A, while the forest value gradient in the lower wage and capital cost market will intersect farther to the right. (Point D will be farther to the right.) Deforestation will be more extensive in the lower opportunity cost market and the alternative labour and capital opportunities are critical determinants of deforestation.

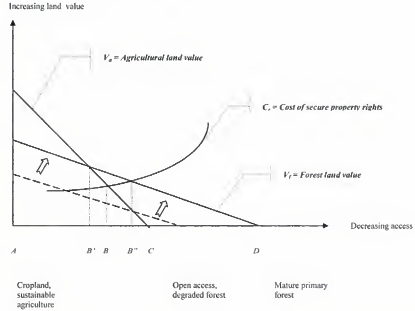
Forest degradation will also be more severe in the lower cost market because smaller and lower quality products still offer sufficient rewards to offset the opportunities foregone while extracting harvests from the open access region.

Illegal logging, a second feature of the open access region: Some governments protect some lands past point B but they must absorb the increasing protection costs - and even then trespass and de facto open access activity occurs. For example, forested parklands around the world suffer encroachment and timber reserves around the world experience illegal logging. An almost unlimited number of well-trained and well-motivated forest guards could not prevent these activities entirely. For example, illegal logging is an issue of serious policy concern in developing countries like Bolivia and Indonesia, where it may be the source of 80 and 51 percent, respectively, of all wood harvests, but it occurs in the US as well (Smith, 2002). For example, some local citizens illegally harvest Christmas trees from the well-managed national forests in the eastern US. The US Forest Service does not expend greater effort to prohibit this theft because the costs of enforcement would be greater than the potential gain - which is another way of saying that the function C_r is above the function V_f.

A mature frontier, stage III: Eventually the margin at D extends far enough - and delivered costs and local prices become great enough - to induce substitution. This occurs when the costs of removal at a point like D plus the costs of delivery to the market equal the backstop cost of some substitute. Substitution may take the form of new consumption alternatives to forest products (for example, kerosene or improved stoves as substitutes for fuelwood or concrete block as a substitute for construction timber), or it may be production-related (as in planting and sustainable forest management on some land closer to the market). Very clearly, the evidence of planting and sustainable forest management is not ubiquitous - but the physical presence of sustainable management is not trivial either. FAO estimates that forest plantations cover more than 187 million hectares worldwide - more than 4 percent of the world's total forest area and more than 1.4 percent of the total area in all land uses. The land area in plantations is growing by almost 4.5 million hectares annually and plantations now supply approximately 22 percent of the world's industrial roundwood (FAO, 2001). For specifically tropical and sub-tropical plantations, Sedjo (1994) observed that the share of industrial wood production doubled from 1977 to 1992. Undoubtedly, that share has increased since 1992. The forest value gradient rises with the increase in delivered costs (from the dashed line to the new solid forest rent gradient in **Figure 3.3**) until, at some moment in time, it intersects the agriculture rent gradient to the left of agriculture's intersection with the cost function for secure property rights.

We might call Figure 3.3 a description of the "mature" frontier of primary forest. For communities at mature frontiers, forest product prices will be sufficient to justify the substitution of managed forests for the resources of the open access natural forest. The new sustainably managed forests occur in the area described by B'B" of Figure 3.3. They may take the form of industrial timber plantations or of agroforestry or of just a few trees planted around individual households or in home gardens. The latter are excluded from most measures of the forest stock but their economic importance can be large. In the semi-arid Denver metropolitan area in the US, for example, trees comprise only 7 percent of the land cover, but they act as a $44 million regional storm-water management system, remove $2.2 million pounds of air pollutants annually and save $50 per household in annual air conditioning costs (Stein, 2001). Throughout south and southeast Asia, trees that grow in plots that are too scattered and too sparse to meet the measurement standards for inclusion in official measures of forest stock account for 65 to 85 percent of all market timber and fuelwood production (FAO RWEDP, 2000). They are major sources of fuelwood in Malawi (Hyde and Seve, 1993) and timber production in Kenya (Scherr, 1995). On the densely populated island of Java, they may account for tree cover on 47 percent of the land area - in addition to the 24 percent that comprises the official estimate of forest land.[7] The 47 percent is not contained in the official estimate because it is composed of scattered trees and stands rather than continuous forest and because its value is for shade, fuel, fruit and estate crops like coconut and palm oil rather than commercial timber.

Figure 3.3 - A mature frontier, stage III


Increasing land value
V_a = Agricultural land value
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V_f = Forest land value
Decreasing access
A
B'
B
B"
C
D
Cropland, sustainable agriculture
Open access, degraded forest
Mature primary forest

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[7] The 47 percent is an estimate from personal communication with D. Garrity in May 2000. The official estimate of 24 percent is from the Government of Indonesia, Ministry of Forestry and Estate Crops (1998). *1997-1998 Forest Utilization Statistical Yearbook*. Jakarta.

In all cases, removals from the mature natural stock are concentrated in the neighbourhood of point D. Mature natural stocks from more accessible lands were removed in earlier times because they were open access resources. In most cases, a mature natural forest of no market or subsistence value exists beyond D. Sometimes the total area of this land beyond point D is negligible (e.g. in Ireland or Cape Verde). Sometimes it extends well beyond the frontier of economic activity at D (Siberia, Alaska, northern Canada, much of the Amazon, a large component of the Rocky Mountains in the US and much of Kalimantan in Indonesia) until it becomes the largest share of reported physical stocks.

Implications for forest and environmental policy analysis: The three figures trace an inter-temporal progression but, at any moment in time, they also describe static snapshots of local conditions and all three local conditions may exist simultaneously in different regions of some countries. They can exist simultaneously because most basic commercial forest products are either bulky or perishable and do not transport well before they reach the location of their next level of processing. Their markets are geographically contained. Therefore, standing natural forest reserves remain in some regions of a country (e.g. Siberia, Alaska, northern Canada, the eastern Amazon, Kalimantan in Indonesia) while the forests in other regions of the same country are depleted and some landowners may have begun to plant trees on their own lands (e.g. the Caucasus, the southern US, southern Ontario in Canada, the developed part of Brazil's Paragominas, central Java in Indonesia).

In sum, this characterization identifies three stages of forest development (**Box 3.1**) and the three categories of forest that exist today: managed forests (including industrial forest plantations, more scattered household trees and agroforestry plantings) over the land area described by B'B", depleted forests from point B (or B") to point D and an unmarketable mature natural forest beyond point D. For most commercial uses of the forest, we could identify a fourth category: the general area of current harvests from mature natural forests in the neighbourhood of D. Commercial timber and fuelwood, the most common wood products of the forest, generally originate from the first (managed forests) and fourth categories. Most forest policy and management is concerned with effects on the first three forest categories. Environmental and aesthetic concerns feature either the last category (e.g. biodiversity and natural preserves) or select locations within any of the first three (parks, erosion control, sustainability).

The critical points are that:

- we must differentiate the forest into these three (or four) categories before we discuss specific policy or market impacts, and
- the appropriate measure of the forest depends on the policy objective.

The differentiation is crucial because the same policy can have opposite effects on different categories of forest. Consider a few examples: timber price incentives are an inducement to improve and expand the managed forests for regions in stage III, but they are also an incentive to expand the deforestation of natural forests. For regions in stages I and II, price incentives have only a negative impact on natural forests. There are no managed forests in these regions to take advantage of the price incentive.

Box 3.1 – Stages of forest development

Forestry goes through three distinct stages of development. I) New frontiers are characterized by clearing of the natural forest for agricultural settlement. II) Developing frontiers are characterized by harvests of the natural forest for its own products; products like timber, fuelwood and latex; but agriculture no longer infringes on the natural forest. III) Mature frontiers are characterized by both managed trees and forests and also by a remaining natural forest. Marketed forest products are extracted from both managed forest and the natural forest frontier.

A region of open access exploitation exists between the area of managed land use (agriculture in I and II, managed forests in III) and the natural forest. The extent of this region and the degree of its degradation depend on the strength of the local institutions ensuring property rights and the opportunity cost of rural labour and capital.

The distinction of three stages of development and at least three categories of forest (managed forest, open access degraded forest and remaining mature natural forest) is important because each category of forest contains different forest-based goods and environmental services.

Similarly, forest cost-sharing and technical assistance programmes are inducements to improve and expand the managed forests in regions in stage III, but they have no effect on regions in stages I or II which only contain natural forests. Agricultural incentives, another example, induce land conversion from the forest to agriculture for regions in new frontiers, stage I. They cause some agricultural conversion from previously degraded lands for regions in stage II - but whether these degraded lands are included in the official forest inventory depends on the local measurement standards. Agricultural incentives have no effect on the natural forest for mature regions in stage III, but they do cause agriculture to out-compete managed forests at their intensive margin (B').

The importance of the particular measure of forest inventory can be illustrated in a comparison of policies intended a) to improve carbon sequestration or b) to protect endangered habitat. All trees sequester carbon. Therefore, an accurate measure of the effect of a policy designed for this objective must include those managed trees contained in orchards, backyards, city parks, windbreaks, along roadsides and in agroforestry cropping systems. These trees are excluded from most official national forest inventories. Overlooking them would grossly misestimate the total amount of carbon sequestered.

On the other hand, most forest-based endangered habitat is contained in the remaining natural forest past point D in our three figures. Measures of the forest that include all three categories of forest would not be good indicators of the remaining natural habitat, and policies designed to affect forests in general but which concentrated their effects on extending the area of managed forests and/or improving the condition of the depleted open access area have little effect on endangered habitat.

In conclusion, the three-stage classification of forest development and the three (or four) categories of forest that emerge from it create a means for tracing both policies and spillovers from commercial activities within and outside the forest onto the various components of the forest. We will rely on this classification in our assessment of the effects of market and policy spillovers and institutional modifications on the various uses of the forest in the next sections of the chapter.

TAXES, INCENTIVES AND REGULATIONS

The general economics literature separates government intervention in the market into "standards and charges". Standards refer to physical limitations such as regulations that restrict the harvest and shipment of logs or environmental regulations that restrict timber harvest activity in riparian zones. Charges refer to economic instruments that permit managerial discretion in achieving publicly acceptable levels of resource allocation. The common charges are taxes or fees for licences or permits. Financial incentives and other government assistance that reduce the costs of production are a second group of economic instruments that are widely recognized in forestry. We will review the effects of forest taxes, incentives and standards or regulations in that order.

Taxes

Governments impose three general categories of tax on forests in one place or another: income taxes, property taxes or their substitutes and severance taxes. Some taxes are primary sources of public revenue. For these, the objective is to collect revenue without altering the use of inputs or the level of output.

Income taxes: Income taxes are taxes on individual income or corporate profits. They are a primary source of revenue for many central governments. When applied equitably across productive activities, they tax equal proportions of income or profits from all activities and the tax burden is the same on all activities. They are neutral with respect to the allocation of land and other inputs between competing productive activities.

Income taxes shift the forest value function V_f downward an equal proportional amount throughout its profitable range - from the solid to the broken lines in Figure 3.2. An equal proportional shift means a greater absolute shift at the left extreme of the function, but no change whatsoever after point *D* where the net return on land becomes zero. Income taxes have no effect on land use at the frontier. They also shift the agricultural value function V_a downward by the same proportional distance. Therefore, these income taxes do not alter the critical land use margins at *B', B"* and *D* (Figure 3.3).

However, the tax codes of some countries include provisions that do not apply equally to all productive activities. Some countries tax income derived from capital gains at a lower rate than other income. Capital gains are the appreciation in asset value that occurs during the period an individual holds the asset. Most timber is held for long periods and it does appreciate over time. Therefore, a lower tax rate for capital gains favours investments in timber (and some other assets like real estate, minerals and oil) in preference to activities like agriculture, retail sales and manufacturing whose production periods are shorter. The effect is not trivial. One estimate for the US suggests that the favourable treatment of capital gains provided 20 percent of the forest industry's after-tax profits in 1984 (Russakoff, 1985).

The favourable treatment of capital gains, with its positive impact on profitability, is an incentive to shift investments in land, labour and capital away from non-favoured activities like agriculture and into favoured activities like forestry. This shifts the competitive agriculture-forestry land use margin (point *B'*) to the left and thereby increases the total land area in managed forests and also increases total production from the managed forests. Favourable treatment of capital gains has no effect on the extensive margin at *B"* because income taxes are proportional to profits. They do not directly alter the use of the land beyond *B"* that is unprofitable for forest management.

Property taxes: Property taxes are taxes on the value of real and personal property - land, its capital improvements, equipment and intangible assets such as stocks and bonds. Property taxes are a primary source of revenue for many local governments. Like income taxes, they are collected annually (or sometimes biennially).

Property taxes are applied to the assessed value of each property. This is generally some proportion of the property's market value in its "highest and best" use. If all lands within a locality were assessed at the same proportion of their true market values and taxed at the same rate, then the property tax on land would shift the agriculture and forest land value functions downward by the same proportional amount throughout their profitable ranges. A diagram of the effect of the tax would be identical to Figure 3.1 for income taxes. However, standing timber and various other assets, as well as land, are also subject to the property tax and their taxation introduces biases into resource allocation. Since timber stands grow in place for long periods of time before they are ready to harvest, each annual collection of the property tax repeats the taxation of unharvested growth from all prior years. The final accumulation of annual property taxes paid on the timber by the time of harvest is much greater than the accumulation of taxes would be if timber production were an annual activity and each period's growth were only taxed once. This effect of the property tax is known as the "time bias" against forest management. It encourages landowners to harvest their timber at an earlier age - in order to avoid some of the repeated and accumulating taxation.

The accumulated property tax on timber makes some land at the extensive margin (*B"*) unprofitable for forestry. The combined effects of the time bias on managed forests and the conversion of the extensive margin into unprofitable forest land were a major reason that many firms in the southern US forest industry "cut and got out" in the 1920s and moved to the American west. The southern industry harvested and then abandoned tens of millions of hectares of cutover lands rather than reforest and pay the property taxes. The forests in the Lake States of the US shared this experience to such an extent that, as the abandoned cutover lands reverted to state ownership between 1910 and 1940, they took on their own name, "the new public domain".

The effect of the property tax on timber management has caused some policy-makers to re-examine local tax systems. In some cases, they have lowered the appraisal of forest lands. In others, they have introduced taxes that are paid only once, at the time of harvest (yield taxes). In others still, they have begun assessing forests according to their current use rather than their highest and best use. This reduces the tax bill on those forests that would have greater value in more developed uses and preserves managed forestry's competitive advantage at the intensive margin. The preservation effect is temporary, however, if the value in alternative developed land uses continues to rise. The preservation effect lasts only until the developed land value exceeds the land's current value in forestry plus the difference in tax bills between the two land uses. The total impact of these "green space" taxes on forest land has probably been small (Boyd and Hyde, 1989).

Severance taxes or royalties: Severance fees or royalties are charges on mature timber at the time of harvest. They are comparable to the stumpage fee paid by loggers to owners of managed stands, except that severance fees usually refer to natural timber in the neighbourhood of the frontier at point D in our three figures. Governments tend to be the nominal owners of timber at the frontier and beyond. Therefore, severance fees provide revenue for government treasuries or for the operation of forest ministries.

Severance fees act as disincentives for legal harvests. Therefore, raising them shifts the frontier at D inward, decreasing deforestation and saving natural forest environment. Whether they increase or decrease government revenue collection depends on the elasticity - just as revenue collection from any commercial activity depends on the price elasticity of the commercial good. Raising severance fees also increases the incentive to avoid the fee and log illegally. This is a critical incentive for forestry. Monitoring and enforcement are difficult in the best circumstances simply because the resource is so dispersed across the rural countryside. Therefore, while higher severance fees are a disincentive for legal harvests, they are also an incentive for illegal harvests and the net effect on the natural forest frontier will depend entirely on local conditions.

Severance fees are an important issue of debate for developing countries and many external advisers argue that governments could increase their revenue and improve the environment by increasing the fee. The government of Indonesia, for example, increased its severance fee in 1999 in response to pressure from external advisers. Government revenue collection has decreased and most argue that illegal logging has increased since then. However, many other factors have changed as well since the east Asian financial crisis of 1997 and the change in Indonesia's government. We still await an empirical examination of the full relationships between severance fees, illegal logging, government revenue recovery, harvest levels and the forest environment - for Indonesia or anywhere else.

Incentives

Forest incentives come in the form of direct financial aid for forest management, free seedlings and advice and technical assistance for forest managers. The primary objective of all three is increased wood supply and all three generally target supply from small landowners. Financial incentives are more common in developed countries. They can afford them. The US, some Canadian provinces, the UK and the Nordic countries all provide financial assistance for small landowners. Even Chile's economy, well-known for its free market, has been modified with a financial assistance programme for forestry, and the success of Chile's forest sector has led policy-makers in some other countries to recommend these subsidies as ingredients in the development of successful forestry sectors. Finally, free or discounted seedlings and technical assistance are common to forest policy and rural development programmes around the world, regardless of a country's development status.

Direct financial incentives, seedlings and technical assistance offer forms of cost savings in forest management. Therefore, their impacts are largely restricted to regions in the third stage of forest development and to the managed forests where cost savings can have a direct effect. Policy-makers and programme managers often overlook the fundamental point that incentive programmes in regions characterized by the first two stages of forest development will not be successful and they waste public resources when they attempt to offer forest management incentives in these regions. Landowners in these regions will not be receptive to the incentives because forest resources from the frontier are still less expensive than managed forest resources. The economically productive lands in these regions yield greater returns in other non-forest activities.

Financial assistance: Direct financial assistance or forest incentive payments (FIP) are monetary inducements to participate in forest management. The US, for example, has administered various financial assistance programmes since the 1920s. The current programme began in 1974. It provides government cost sharing for up to 75 percent of all reforestation and management expenses for landowners with fewer than 210 hectares (Boyd and Hyde, 1989). Chile, as another example, began its FIP programme in 1974 with the objective of improving the international competitiveness of its forest sector. Chile's programme returns 75 percent of costs to the landowner one year after successful afforestation. Reforestation without compensation is compulsory for successive timber rotations. In 1992 the programme was restricted to landowners with fewer than 500 hectares.

The impacts of FIP programmes on land use can be traced through Figure 3.3. Financial assistance decreases the private management costs and, therefore, allows the forest value function V_f to shift upward by the per hectare value of the assistance. Land at both the intensive and extensive margins (B' and B'') shifts away from competitive uses and into forest management and total production from the managed forest also increases.

The effect of the US FIP programme is likely to be small because many landowners fail to take advantage of government assistance and because many other factors are important for those landowners who do obtain government assistance. Some accept the assistance without ever intending to harvest their forests (Boyd and Hyde, 1989). The effects of Chile's programme may be greater. The non-industrial private landowners who receive assistance account for nearly 40 percent of the timber supplied to Chile's large forest and wood products sector, its fifth largest source of GDP and third largest source of export earnings. Many of them would not have afforested their lands without the initial promise of government assistance. Therefore, government financial assistance may be a source of significant increases in forest land use and timber production in Chile.

Distributive arguments are sometimes used to justify FIP programmes. These should be accepted with caution. In developed countries, even small forest landowners are not among the poorest or most disadvantaged for whom we design our redistributive policies. Moreover, in the US, Boyd and Hyde (1989) observed that those who do take advantage of the FIP programme are not among either the poorer or the smaller private landowners. Furthermore, it is an open question whether FIP programmes are of greater benefit to the landowners or to the wood processing industry that obtains its timber for lower prices because of government assistance for forest management.

Free seedlings: Various public programmes around the world donate seedlings to smallholders and communities, or build nurseries that provide seedlings at discounted prices. These have the same general effect as FIP programmes. They decrease the costs of forest management.

Like FIP programmes, the effects of free or discounted seedlings are restricted to managed forests within regions in the third stage of forest development. Also like FIP programmes, the effects of seedling distribution programmes can be traced from private financial savings for the seedlings through its increasing effect on the net forest value function V_f. The final effect on land use and forest production, even in the third stage of forest development, is probably small in many cases, although there are numerous examples from countries of various levels of economic development, where farmers willingly accepted seedlings and tended them to maturity.

Technical assistance: Technical assistance programmes are also known around the world, often in the form of forestry extension programmes. These programmes are designed to bring the latest information on modern technologies to local forestry operations. Like FIP programmes, forestry extension generally targets smaller operators. Occasionally, it includes advice on improved logging techniques. In this case, it has an impact on timber harvests in all three stages of forest development - leading to additional recovery of usable material from the residual open access forests and potentially extending harvests farther into the remote frontier.

More generally forestry extension, like agricultural extension, is designed to assist landowners improve their land management. Therefore, like FIP programmes and free or discounted seedlings, the effects of most technical assistance programmes in forestry can be traced through their impacts on the forest value function and on managed forests in the third stage of forest development. The greater questions for many forestry extension programmes have to do with obtaining rapid and widespread adoption of the preferred new technologies. In fact, these are important questions for FIP and seedling programmes as well. The experience of agricultural extension is relevant. In agriculture, better informed landowners and landowners who can afford the uncertainty inherent in trying a new variety of seed or a new production technology are the obvious targets for initial assistance. Other landowners will follow rapidly as they observe the successes of their neighbours (Feder *et al.*, 1985).[8] Of course, the greater the management cost saving due to the new technology (the larger the positive impact on the forest value function V_f), the more rapid and widespread the rate and final level of adoption.

Regulations

Forestry has a long history of government regulation. The initial regulations were designed to protect the forest as a hunting ground for kings and large estate owners. Additional regulations were designed to protect the best trees for the kings' navies. The emphasis on the rights of kings and large landlords changed in the latter part of the nineteenth century. First a sustained flow of timber and then, later in the twentieth century, a sustained flow of other environmental services from the forest became new justifications for government regulations. **Table 3.1** traces the general pattern of forest regulations through the twentieth century. It lists the most common regulations in forestry in the order in which they have been introduced in most countries and it also identifies the general reason given for each regulation. In each case the fundamental reason is the protection of some broader social value.

Some North American and northern European countries began requiring reforestation following timber harvests as early as the 1930s. Today, some developing countries require a permit before allowing harvests even on private lands. Others restrict the shipment of timber across provincial boundaries. The objective has always been to control unlimited harvesting and to ensure a resource supply to local mills.

As the laws and policies of the developed countries began to focus on the environment, these countries introduced new restrictions on harvest systems. In North America, restrictions on clearcuts or regulations ensuring selective forest management became widespread. These were followed by restrictions on specialized forest practices as the public became aware of the detrimental effects of those practices. Herbicide and pesticide usage on forests were controlled, for example, once the human health effects of substances like DDT were recognized.

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[8] The agroforestry evidence follows the agricultural experience, although the analytical evidence is not as extensive. See Pattanayak *et al.* (2002) for a review.

Water quality restrictions are another example. As water quality became a public concern, the laws and policies protecting it first focused on point sources like effluent from pulp and paper mills. By the mid-1980s the emphasis shifted to non-point sources like agriculture and forestry.

Table 3.1: Common regulations of private forest lands

Regulation	Public objective
Reforestation requirements and silvicultural practices	First, long-term timber supply. Later, environmental protection
Restrictions on specific activities:	
- log harvests and shipments	Long-term timber supply. Protection of jobs, mills and communities
- clearcutting	Aesthetic appeal and environmental protection
- herbicide and pesticide use	Public health
- water quality guidelines	Public health, environmental quality
- streamside management	Habitat protection
More recent concerns - often discussed but less frequently imposed:	
- protection of endangered habitats	Environmental quality, future public welfare
- forest certification	Sustainable forestry, environmental protection
- carbon payments	Carbon sequestration, protection against global climate change

Pulpmills are point sources because the exact point of their detrimental discharge, the pipe from which it spills, can be identified. Agriculture and forestry are non-point sources because their contributions to water pollution cannot be traced to a single discharge point. Rather, their water quality effects originate from activities like herbicide usage or general soil disturbance that are dispersed over large areas.

Finally, the most recent regulatory issues for private forestry refer to endangered species and carbon sequestration to protect against global climate change. All regulations are intended to encourage preferred behaviour or discourage the opposite (**Box 3.2**). As examples, the impacts of four categories of regulation will be examined: i) restrictions on harvests and shipment, ii) reforestation requirements, iii) environmental requirements such as restrictions on herbicide use, streamside management and clearcuts and iv) certification.

Restrictions on harvests and shipment: Restrictions on harvests are intended to ensure a long-term supply of the resource or, in some cases, to permanently protect the natural forest. Restrictions on shipments are intended to ensure a supply for local mills and thereby protect the welfare of local communities. Restrictions in many countries on shipments confine timber within state or provincial or some other local boundaries. Some countries have log export restrictions - which have the same effect, except that they restrict shipments from leaving the country rather than the internal region of a country.

Box 3.2 - The design of forest regulation - and its merit

Forest regulations are generally set as absolute physical standards such as no clearcuts over 10 hectares, no harvests within 10 meters of a watercourse, diameter limits on felled trees and distance between felled trees, or zero disturbance within the habitat of an endangered species.

Economists often argue that it would be more efficient to identify the desired behaviour, scenic improvement, erosion control, natural forest regeneration and endangered species protection in the examples and then charge landowners according to their failure to achieve the desired objective. This approach would allow distinctions in the levels of charges between landowners who are more or less successful in achieving the objective; and increases in the charge would improve the incentive for the desired behaviour on the part of landowners who deviate further from the objective. A system of charges would also encourage landowners to tailor their management plans to the unique characteristics of their own lands. For example, a landowner might be able to harvest within five meters of a stream course over gently sloping land but only within 30 meters of steeper and more erosive lands.

In fact, environmental charges have become an acceptable alternative to regulatory standards for some forms of pollution. There is good evidence that they induce the desired behaviour in pulp mills. However, assessing charges at the pipe where a mill discharges effluent is one thing. Assessing charges for a non-point source like forestry is much more difficult. It might be easy to identify clearcuts but identifying the sources of stream sediment or the degrees of modification of endangered habitat would impose large financial and other resource burdens on the public agencies responsible for monitoring and enforcing the regulations. Enforcement could easily cost more than the public benefit derived from it and this is one reason why forestry tends to rely on a number of environmental standards rather than on systems of graduated charges.

Harvest restrictions occur in two basic forms. Some restrictions, known as logging bans, are intended to be absolute, halting all harvests on certain varieties of forest, such as remaining natural forests. Other restrictions are intended to control certain varieties of harvest or to limit harvests to approved levels. Logging bans are difficult to enforce because governments cannot hire enough guards to protect the entire forest and because it is difficult to prove that delivered timber came from the protected source - rather than from some farm woodlot. Logging bans quickly raise the spectre of expanding illegal harvests. More limited restrictions such as quotas for timber harvests create uncertainty in the minds of landowners regarding their right to make future harvests. Uncertainty encourages landowners to harvest earlier than they would without the restriction - while they can still be certain of an economic return. There may be a short-term increase in the harvest level as landowners hurry to obtain some certain return. However, the longer-term effect is negative as landowners transfer some forest lands into alternative activities where the economic returns are more certain and timber supply decreases as a result.

The costs of timber harvest permits, when available, also reduce returns to landowners. Sometimes these costs are small and their impacts may be inconsequential. In other cases, obtaining the permit consumes more time and financial resources and, even then, their availability may be uncertain. In these cases, the high costs make lands at the intensive and extensive margins of managed forestry (B' and B" in Figure 3.3) less competitive as managed forests and they cause landowners to manage their remaining forests and trees less intensively. The standing timber resource and the long-term supply decline as a result - in direct contrast with the policy objective to ensure long-term supply.

India and Sri Lanka provide examples. India restricted all harvests of its high-valued but declining sandalwood in an effort to preserve the remaining resource. Some landowners responded by harvesting immediately, before the restriction became effective. Others have harvested illegally since then and the standing sandalwood inventory has actually declined since the restriction became official policy. Sri Lanka restricts all harvests from its remaining natural forest and requires permits and inspections before allowing harvests on private lands as one of the means of ensuring that harvested logs do not come from the protected natural forest. Permits have become such a serious constraint on supply that delivered log prices are as much as seven times the price received by producing landowners. The various costs associated with obtaining the permit absorb the difference. Therefore, the higher price has not become an incentive for additional management by private landowners and the managed forest inventory has declined. However, the higher price has been an incentive for illegal logging of the natural forest - also in direct contrast with the original policy objective. Timber production is now about one-fourth the level it was prior to the permit system and perhaps as much as half of all wood delivered to Sri Lanka's mills is the result of illegal logging (Gunatilake, 2002).

Restrictions on shipment, including export restrictions, have a similar set of final effects on the forest. Their first effect is to reduce the number of loggers and mills eligible to compete for a resource. The US, Philippines, Nepal and China, for example, each restrict at least a share of some timber sales for local mills. These countries may succeed in protecting some less-competitive local mills in the short run. However, it is not clear that local community welfare is significantly enhanced because wood processing is generally a small share of local economic activity and loggers and mill workers have other employment opportunities. The long-term effect of shipment restrictions is identical to that of harvest restrictions. Landowners obtain lower prices for their timber and their incentive to manage and produce a long-term timber supply for local mills declines. Both margins of managed forest land shrink and this is certainly not in the interest of community welfare.

Reforestation requirements: Required reforestation following a timber harvest was originally introduced as another means of ensuring long-term timber supply. More recently, the objective has shifted to general environmental sustainability. Between 1903 and 1950, 16 US states introduced laws requiring reforestation to satisfy the first objective. Nine states revised or introduced new laws after 1968 to address the broader second objective. All the Nordic countries, several other western European countries, as well as Brazil, Chile and Ghana, for example, have similar laws with similar objectives. Forests regenerate rapidly and naturally on some lands. On these, the reforestation requirement imposes no real cost. On others, it adds the cost of reforestation to the timber harvest costs. This shifts the forest value function V_f downward. Where the requirement is enforced, harvests at the frontier decline and most would consider this an environmental improvement.

Required reforestation has no impact on the managed forests of the third stage of forest development because reforestation is already economically viable for these forests. Boyd and Hyde's (1989) empirical examination of the reforestation component of Virginia's state forest practice act supports this contention. Boyd and Hyde examined private forest management in the states of Virginia and North Carolina. These states are geographically adjacent and similar in their forest lands. Virginia has a reforestation requirement, while North Carolina does not.

If the requirement were effective, then a greater level of reforestation should accompany it and, over time, standing forest inventories should also be greater. However, after checking for differences in site quality and regional prices, Boyd and Hyde observed no measurable differences in standing forest volumes between the two states.

Additional silvicultural prescriptions: A number of additional silvicultural and other environmental prescriptions have been imposed on timber harvesting and continuing forest management activities in several developed countries and a few tropical developing countries. These include limitations on clearcutting, harvest spacing restrictions designed for the regeneration of mixed forests, restrictions on the use of herbicides and pesticides and standards for streamside management and logging roads.

The added costs implicit in these environmental regulations shift the forest value function downward. Added management costs, such as those incurred for restrictions on herbicide use, pivot the function downward and affect only the range of managed forestry. Added harvest costs, such as those incurred for restrictions on clearcuts, shift the function downward over its entire range, reducing the land area in managed forests at both the intensive and extensive margins and also decreasing management intensity on the remaining managed forests. Harvests at the frontier decline as well.

The net effect is substantial. Sedjo (1999) estimated that these regulations add an average of 5 to 18 percent to the costs of forestry in the southern US, British Columbia and Finland - although the impacts on individual landowners vary with local land quality and enforcement conditions. If these costs are roughly comparable to a similar decrease in the stumpage price received by the landowner, and the supply price elasticity is greater than one (the common expectation), then they suggest an even greater percentage decrease in timber supply from the regions affected by these regulations.

Clearly, these environmental regulations alter forest production in important ways, decreasing production while improving the forest environment. However, the magnitudes of the costs and their effect on production raise two new issues, one for private land managers and the other for public environmental values. Private landowners challenge the "taking" of their land use rights that occurs when the government imposes new regulations that restrict them from making some decisions and benefiting from opportunities that were available before the new regulations were imposed. This concern is probably greatest in the southern US where non-industrial private landowners manage two-thirds of the forest land and account for 60 percent of annual timber harvests and where reforestation, water quality and endangered species restrictions on private lands have become more confining in recent years. Taking is also an issue of contention, however, in parts of Canada and in the Nordic countries. In fact, it is an issue in any place where expanding public environmental awareness threatens to affect private forest landowners - but promises them no restitution. As with uncertainty about harvest restrictions, uncertainty about increasing environmental regulation has caused some landowners to act pre-emptively. They have harvested early, before the policy became official, thereby ensuring to themselves some level of return on their timber investment, but foregoing any opportunity for greater return on the growing timber and also permanently damaging any environment that would have been protected by the new regulation.

The new issue for public environmental values has to do with shifts in the geography of production and environmental losses that must occur when the regulations are imposed in selective regions only. Consumer demand is unaffected by these regulations. Therefore, the significant decreases in production that occur in the southern US, British Columbia and Finland, for example, will be largely compensated by increases in production from other parts of the US, inland Canada and Russian Korelia, respectively, as well as with additional imports from developing countries. In each of these cases, the production shifts are largely from managed forests of regions in the third stage of forest development to the natural forest frontiers of regions in the second stage of forest development. Environmental standards are generally lower or non-existent in the regions of alternative production. Therefore, while the higher environmental standards improve environmental quality in the southern US, British Columbia and Finland, the same regulations effectively export environmental damage and deforestation to other parts of the world.

This effect is generally overlooked by those interested in improving the forest environment. The same interests that demand environmental improvement at home and desire to reduce deforestation globally are forcing a share of all production to shift away from sustainably managed operations at home to unsustainable harvesting at the frontier of other regions. While the trade-off between environmental improvement in one region and environmental decline elsewhere is unknown, the magnitude of additional silvicultural costs in the southern US, British Columbia and Finland suggests that trade-off must be substantial. Shifting more than 5 to 18 percent of the production in only these three regions to other, more environmentally risky regions could imply serious global environmental losses.

Certification: Certification refers to the assurance from an independent authority that forest products originate from sustainably managed forests. Although certification is not the official policy of any government at this time, it is widely encouraged, especially among western Europe's environmentally conscious consumers, and it could become policy in some countries in the future (Hansen and Juslin, 1999). Until it becomes a formal government policy it can be anticipated that landowners will seek certification when they perceive that it brings them advantage in the markets for their products, either a price advantage, improved market share or an opportunity for penetration into new markets. This means that the anticipated benefits of certification, the higher prices or increased share of an environmentally aware market, must offset the costs of obtaining the certification.

We can anticipate that only the owners of managed forests from regions in the third stage of forest development should be able to provide legitimate evidence and make successful requests for certification. Northern Europe is largely within the third stage of forest development and many firms in its industries rely on wood supplies from managed forests. Certification does not impose a significant cost on them. In fact, more than 25 million hectares, or half the global total, have been certified in the Nordic countries (Bass *et al.*, 2001).[9] Consumers express greater concern for the certification of forest production from tropical and developing countries. A much greater share of the forest products from these countries tends to come from natural forests in regions within the first two stages of forest development. Indonesia's example illustrates some of the problems for certification in these latter cases. Indonesia is the largest exporter of forest products in Asia and forest products are the third largest source of Indonesia's export earnings. Indonesia's large producers are rushing to obtain certification and thereby gain a share of the European market. They could

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[9] The experience is similar in the Republic of South Africa where all the commercial wood comes from plantations that were originally established in the 1890s by a government that recognized Europe's demand for a reliable timber supply. Certification imposes no significant cost on these plantations and almost all of them are certified.

become major exporters to Europe. The small and new Indonesian certification institute cannot keep up with the demands for its services.
Nevertheless, it is difficult to imagine successful certification for a significant share of Indonesia's forest products. Less than 10 percent of Indonesia's annual harvests come from managed forest plantations and most of its timber markets are characterized by the first two stages of forest development where sustainable management is not yet financially viable. Certification faces an additional problem where the unsustainably managed share of all forest products taken from the unmanaged natural frontier is so large. The products of managed and unmanaged forests and unsustainably managed forests are similar and one easily substitutes for the other at the mill. Therefore, we can anticipate that either the monitoring costs associated with certification will be great or certification itself will not be a reliable guarantee of production from genuinely managed forests.

In sum, the concept of certification is young and the procedures for its administration are still developing. It will face its most serious challenges in producing regions that are largely characterized by the first two stages of forest development and reliance on the natural forest, yet regions that are also significant suppliers for consumers who wish to have the assurance of certification. Indeed, the measure of certification's success should be whether certification ever becomes the reason why any logging company operating at the forest frontier converts to a programme of long-term forest management.

ADJACENT SECTORAL POLICY AND INSTITUTIONAL SPILLOVER EFFECTS

As policy changes induce expansion or contraction in the sectors that compete with forestry for inputs, these policies also affect forestry. Similarly, as policy changes induce expansion or contraction in sectors that consume forest products, they too affect forestry. The important competition for inputs is the competition for land, most generally between agriculture and forestry. A variety of industries consume the outputs of the forest in their own production processes: rubber; producers of exotic fruits, nuts and natural herbs; outdoor recreations, etc. Of these, the wood products industries have the greatest effect on most forests. The effects of policy change in these two sectors, agriculture and wood products, will be the focus of our attention.

Extensions of the local infrastructure and modifications in the local and national institutions are both functions of public policy and they too can be important determinants of forest development. Therefore, changes in regional infrastructure and institutions will be added to the discussion. While neither infrastructure nor institutions are regularly considered as components of policy, policy can alter both and both are important determinants of forest development.

Agricultural policy spillovers: Agricultural policies affect agricultural land use, including those agricultural lands that are newly converted from forests. Therefore, agricultural policies may affect forests as well. However, the discussion of the pattern of forest development showed that the relationship between agricultural and forest land use is not consistent across the three stages of forest development. Furthermore, not all agricultural improvements use more land. The impacts of agricultural policy on the forest are complex for these reasons.

Many countries have had policies that encourage agricultural growth. For example, the US and Canada encouraged agricultural settlement on their frontiers in the nineteenth century, in the 1980s Indonesia financed the movement of new settlers to the forest frontier in a policy called "transmigration", and in the early 1990s Finland compensated farmers for clearing new land for agricultural use. For a period in the 1990s, Brazil gave title to Amazon forest land to anyone who cleared it for agricultural or livestock use. In each case, agricultural (or population) policy shifted the agricultural value function V_a upward, at least at its far extremity, and encouraged agricultural expansion within a region in the first stage of forest development.

As we progress into the second and third stages of forest development, agricultural policies no longer have an effect on the forest frontier. By this time, the more common agricultural policies are subsidies for agricultural inputs and price supports for agricultural outputs. Input subsidies tend to encourage the use of fertilizers and water, in particular. They decrease capital costs and increase the marginal product of a dollar's worth of capital input. They cause producers to shift input proportions, increasing the relative use of the subsidized capital and decreasing the relative use of labour and land inputs. In terms of our figures, these capital-consuming and land-saving technologies shift the agricultural value function upward along its vertical axis and increase its slope. Depending on the magnitude of the subsidy, these programmes can either expand or contract agriculture's use of the degraded open access lands (between points B and D) in the second stage of forest development and can either increase or decrease agriculture's competitive position at the intensive margin of forest management (B'') in the third stage.[10]

The effects of agricultural input subsidies are compounded by the effects of government agricultural research programmes. These are not among the programmes usually considered when we discuss government interventions in the market. However, within agriculture, they represent substantial government investments and some of these investments have produced phenomenal increases in agricultural productivity and decreases in agricultural costs (see Ruttan, 1982 for a survey). They tend to make capital inputs less expensive and more productive. Therefore, they also tend to be relatively capital-consuming and land-saving and their effects on the forest are comparable to those of agricultural input subsidies.

The effects of price supports on agricultural outputs contrast with the effects of input subsidies and government research. Agricultural price supports shift the agricultural value function upward throughout its range and introduce agricultural management on some of the degraded open access lands for regions in the second stage of forest development. For regions in the third stage of forest development they improve agriculture's ability to compete with the intensive margin of managed forestry, thereby converting some land away from forest management. The net effects on forests for regions in the second and third stages of forest development are further complicated as some developed countries have introduced incentives to remove land from agricultural production. Some of this land, no doubt, reverts to forest. In fact, the US Agricultural Conservation Reserve programme specifically subsidizes the reversion to forest land. Ireland has a similar programme. Therefore, in some countries programmes are observed that support the conversion of forest to cropland in some parts of the country while other programmes support the opposite, cropland reversion to forest, in other parts of the country.

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[10] Where agriculture expands into the open access frontier (stage II) or converts land away from managed forestry (stage III), the policy has induced *absolutely* greater use of both capital and labour, but it remains *relatively* capital-consuming and labour-saving.

The mixture of effects of agriculture policy is complicated yet further by the variability of programmes between agricultural products. For example, in the US wheat may be a greater beneficiary of output price supports while cotton and livestock may be greater beneficiaries of water and grazing subsidies. The total effect of agricultural programmes causes some products, like milk and cotton and peanuts in the US, to be produced in regions where they would never appear without government assistance. In all cases, the pattern of effects traces through the entire agriculture sector, with government assistance to higher-valued crops affecting the land use margins of those crops with lower-valued crops until eventually the shifts affecting some lower-valued agricultural product causes a shift in its competition for land use with either the degraded open access forest (stage II) or managed forestry (stage III).

The net global effect is only speculation, but many would speculate that the very large scale of the North American and European Union agricultural support programmes is the determining factor. The US and Canada spend roughly US$40 billion annually on agricultural programmes and the EU spends an even larger amount. These immense expenditures fund the excessive use of all inputs, including large shares of North American and European land that would otherwise be under tree cover. They create excessive agricultural production, some of which is exported to developing countries where its low prices drive out competition from local agriculture products. Some of the disemployed local commercial farmers and agricultural workers revert to subsistence farming, which uses land more extensively than commercial agriculture, and still more land is converted from forest to subsistence agricultural use because of the North American and EU agricultural policies.

Spillovers from policies designed for their impacts on the wood products industry: Policies directed towards wood products industries affect the demands of those industries for their raw materials and through these demands they also affect forestry itself. The common objectives of policies designed for these industries are the protection of the domestic industry from international competition and the promotion of its development, although controls on environmental pollution can also be important, especially for the pulp and paper industry. Log export bans are the common means of protecting the processing industries. Their effects are much like the effects of restrictions on timber shipments discussed previously. A policy to restrict exports removes international competition from the domestic market. With only domestic processors competing for timber, demand declines and domestic prices shift downward. This is a benefit for the domestic wood processing industry but it is a disincentive for forestry itself. The net forest value function V_f shifts downward throughout its range. Both the area in managed forestry and the level of managed forest production decline for regions in the third stage of forest development. Harvests at the natural forest frontier also decline - for all three stages of forest development.

Several Asian countries have log export bans and both the US and Canada have banned the export of certain classes of logs from the Pacific Northwest. Indonesia's experience provides a good example. Indonesia's log export ban was intended to promote forest-based industrialization and employment. It did help accomplish this objective, especially in the plywood industry. Indonesia was the world's largest exporter of tropical hardwood logs in 1980, exporting 60 percent of its harvests. A gradual ban on log exports, introduced in the early 1980s, became total in 1985. The domestic wood processing industry expanded immediately. The export of both plywood and sawnwood increased from a very low level in the mid-1970s until exports were more than half of Indonesia's total production of processed wood by the mid-1980s. Indonesia became the world's largest exporter of hardwood and plywood and wood products became the third largest source of Indonesia's export earnings prior to the East Asian financial crisis in 1997. However, growth in the plywood industry came at a cost. Domestic log prices fell below the world price through the 1980s and 1990s. Fitzgerald (1986) estimated that for every dollar gained in the value of plywood exports, four dollars were lost in foregone log exports. The employment gains were small, less than one person for every 50 hectares harvested (Gillis, 1988). The reduction in demand and lower prices coincided with a reduction in harvests by as much as 50 percent. Most of the reduction came at the natural frontier as most of Indonesia was in the second stage of forest development and only about 3 percent of Indonesia's harvests at that time originated from plantations.

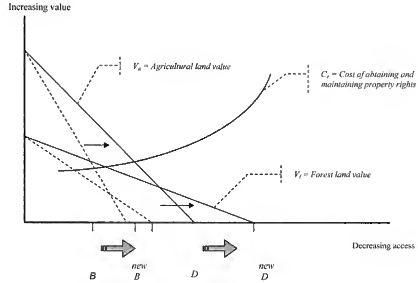
Government-sponsored research in wood processing, as in agriculture, has been another source of industrial development - and a source of reduction in the demands for wood as a raw material. US government-sponsored research for the southern pine plywood industry produced rates of return in the neighbourhood of 300 percent per annum throughout the 1960s and 1970s. One research improvement alone, the powered back-up roller, improved wood utilization and reduced the plywood industry's demand for logs by 17 percent. Overall research-induced cost reductions in southern pine plywood were a critical component of the rapid expansion of the industry throughout the 1970s and 1980s. Expansion in this industry increased the demand for southern pine logs. However, southern pine plywood substitutes for western pine plywood and also for lumber in some of their common final uses as construction material. Southern pine plywood typically utilizes more of the log than either of the latter products. Furthermore, the southern pine region is in the third stage of forest development with a significant share of its timber originating from managed forests, while western US forests are more generally characterized by the second stage of forest development and a much larger share of western US harvests originate from mature natural forests. Therefore, it can be safely concluded that government-sponsored southern pine research decreased the total US demand for logs as well as total US harvests at the natural forest frontier.

Infrastructure: The term infrastructure includes public utilities and public services like education, hospitals and communication networks. Antle (1983) showed that the full collection of items identified with infrastructure has a significant and positive effect on rural economic development in general. Improved roads in particular have important effects on the general condition of natural forests. They have a lesser effect on managed forests because the latter occur in regions that are already developed. In the earliest stage of forest development, the community and the forest are in the closest proximity, or even intermingled. All roads affecting the community also affect agricultural development and the natural forest. New roads improve the conditions for local development. They shift the agriculture and forest value functions to the right, converting some degraded forest into permanent agricultural land but also degrading and deforesting additional lands - as in **Figure 3.4**.

In the second and third stages of development, roads that extend to the forest continue to have a *direct* effect on the forest. The improved access makes the region's land more valuable in all uses. Once more, the agriculture and forest value functions shift right, moving the important land value margins (*B* and *D* in stage II; *B'*, *B"* and *D* in stage III) with them. This extends the claims of permanent agriculture and shifts the entire degraded open access area further into the geographic interior in stage II. In stage III, it extends agriculture into the area of previously managed forest and extends managed forestry into the area of previously degraded forest. The natural forest frontier shifts further into the interior as the deforested area expands in both the second and third stages of forest development. Thailand provides a very clear recent example. Thailand built roads into its more sparsely inhabited northeast in the 1960s.

The policy objective was security - military access and encouragement for human settlement to secure the region against encroachment from Laos and Cambodia during the Vietnam War. Of course, timber harvests followed.

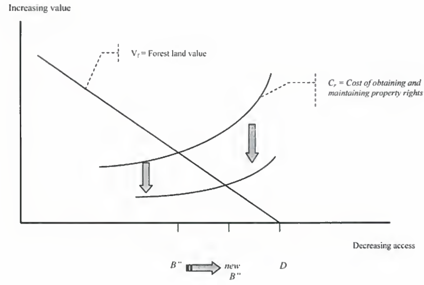
Figure 3.4 - Extending the road system (the example is for a region in Stage II)


Increasing value
V_a = *Agricultural land value*
C_r = *Cost of obtaining and maintaining property rights*
V_f = *Forest land value*
Decreasing access
B
new B
D
new D

In fact, rights to adjacent lands and timber are often part of a government's payment to private roadbuilding contractors. The US government transferred alternate square-mile patches of public domain for 10 miles either side of some railroads as payment for their construction in the nineteenth century. The government of Laos recently made a similar transfer of timber rights for building a highway through its northern forests to provide access to the rapidly developing markets of southern China.

Institutions: Like infrastructure, the institutional arrangements for local exchange, and particularly the arrangements for local property rights, have a forest development effect. In developed countries, we tend to think of property rights in terms of formal titles to land and other resources. However, Feder *et al.* (1988) used an example from Thailand to demonstrate that formal titles are insufficient protection unless the titles can be transferred easily as higher-valued uses of the resource present themselves. On the other hand, Migot-Adholla *et al.* (1991) used examples from sub-Saharan Africa to show that formal titles are unnecessary where customary rights are sufficiently enforced by the local community.

Figure 3.5 - Transferring property rights from a central agency to a local institution (the example is for a region in Stage III)



Both points are important in forestry today, as many countries are finding that formal rights to forests, which tend to be the official responsibility of the forest ministry, are not easily enforced. Yet some local communities protect their forests even when they have few formal rights to these resources. In fact, these considerations provide the justification for the transfers of public forest to some form of local private or local community-based forest management. The familiar terms; "community forestry", "joint forest management", "public participation' and "devolution" all refer to transfers to local users of some or all of the rights to forests that were previously the unambiguous responsibility of central forest ministries. The economic argument for these transfers is that local users of the land and forest resources know those resources and the demands on them better that the officials of the forest ministry. Furthermore, the local users live closer to the forest and their daily activities put them in closer contact with it. Therefore, local users can manage the resources more efficiently than the ministry and they will have greater success than the ministry in enforcing their management intentions. In terms of our figures, the shift to local management will reduce the transactions cost function C_r, as in **Figure 3.5**, more land will be managed sustainably (points *B* or *B''* shift to the right) and the area of degraded open access forest will decline.

These arguments and the shift to local management work well where the forest values at stake are local, where they are shared by most of the community and where they are relatively large enough to justify local management of the resource. Therefore, local management can improve long-term land management for agriculture, timber and other extractive products of the forest and also for local non-market values like some erosion control and recreational forest use. The list of successful examples of community management is almost endless and it comes from all corners of the world. However, local property rights and local management do have their limits.

Transfers of rights to local communities are less successful where the local values for forest products are very low relative to the community's values for other uses of their land and their own time. This is the general case in the first stage of forest development. The forest is plentiful and members of the local community have little interest in using their own scarce resources to protect it. It is also the case for the lands that remain in an open access condition under the best institutional arrangements (the lands between *B* or *B"* and *D*) in the second and third stages of development.

Local management will be less successful in several other cases within the second and third stages of development. It will be less successful where important local groups have competing demands on the forest. For example, community management has not been successful for the eroding hillsides around Basantapur in Nepal. The higher income agricultural households in the community prefer to exclude all activity from the forests on these hillsides in order to prevent erosion and downstream damage to their agricultural lands. The poorer landless households rely on these forests for fuel. The higher income households formed a forest protection committee and hired forest guards, but the guards have been unable to prevent fuelwood collection and further degradation of the forest by their trespassing poorer neighbours (Dangi and Hyde, 2000).

In addition, local management may be no more successful than management by the forest ministry where either the local property rights are incomplete or the policy environment is uncertain. Incomplete property rights are common in forest transfers as the ministries often desire to maintain some degree of oversight - but often succeed only in removing the incentives for local management. The Philippines provides an example of the former, incomplete rights. The Philippine Bureau of Forest Development (BFD) established a policy of land transfers to communities in the early 1990s supported by a US$40 million loan from the Asian Development Bank. However, various NGOs were concerned about the potential distribution of benefits from the transfers and BFD was concerned that the communities would fail to follow its own perception of good management practices. Therefore, BFD required each community to hire a forester, to report management plans to regional and central advisory committees for approval and to return 44 percent of gross revenues from the community forests to a central budget used to pay down the loan. These requirements were too severe and not one community in the entire country applied for the transfer of community forests until these requirements were withdrawn in 1997 (Hyde *et al.*, 1997).

Yin and Newman (1998) illustrate the latter problem, an uncertain policy environment, by contrasting experience from two regions in China. Following the introduction of agricultural reforms in 1978, the Chinese authorities gradually extended to farmers the rights to manage and harvest trees on lands of China's former farm and forest collectives. In the northern plains, the authorities paid little attention to forestry, the farmers initially harvested trees as they obtained the new rights, but they also planted and, over time, both the standing forest and the level of harvests increased sharply. In a second region just south of the first, the authorities gave rights to farmers and then subsequently took rights back from some farmers. In fact, they had changed farmers' rights another three times in the 20 years preceding reforms. Farmers in this region responded to their uncertainty about the permanence of their rights by harvesting without replacement. Both the level of the standing forest and the level of successive years' harvests declined despite the fact that the rights to the land and trees were similar for both regions by 1985.

Finally, local management is never a successful substitute for regional or national management, or even global assistance, when the values at stake are public values that are shared by the broader regional, national or global community. Carbon sequestration, biodiversity and some kinds of tourism are all in the global interest. In these cases, broader institutional management is necessary to ensure that broader interest, but local involvement is also necessary in order to ensure local cooperation - instead of local trespass in search of local extractive products. Numerous national parks in both developed and developing countries have successfully included local participation in the benefits of the park (e.g. providing various tourist services and also employment in park management itself). Even in these cases some amount of trespass is inevitable. It may be anticipated that creating a local interest in sequestering carbon or protecting biodiversity will be even more difficult (**Box 3.3**).

Box 3.3 – Property rights

The widespread modern discussion of some form of forest transfers from state agencies to local communities ('community forestry', 'joint forest management', 'public participation') has property rights at its core. What should be clear (but often is not) is that the institution that can manage best is the institution that is most affected by the values at risk. For global treasures, like unique habitats or high profile national parks, national or even global institutions will be appropriate. For local values, like erosion control on a small watershed, then local institutions will be more effective managers.

MODERN POLICY EXAMPLES

This section of the chapter discusses five key forest products and environmental services: i) timber and non-timber forest products, ii) carbon sequestration to protect against global climate change, iii) erosion control and general watershed protection, iv) biodiversity and critical habitat and v) tourism.

Timber and non-timber forest products: The focus of the policy discussion in forestry has shifted over the last 40 years. Timber supply to support a domestic industry and economic growth, and its European counterpart, the creation of a strategic timber reserve, were central to the discussion in Europe and North America for at least 100 years. The colonial powers in these continents exported their concerns to government forestry agencies and forestry schools in the developing world until timber supply became the dominant forest policy issue in almost all countries and the world now has long experience with policies addressing the "timber supply problem".

The conclusion of this experience is that timber is a market valued product and the market provides for it, either from natural stands at the frontier or from managed stands, in just the manner described in the first section of this chapter. In fact, the market has responded to increasing demands for timber, but policies designed to improve timber supply have not had overwhelming success (see Section 3.3). Forest incentives and technical assistance have probably caused smaller expansions of timber supply when they were directed at regions in the third stage of forest development, regions that already contained some managed forests. These policy instruments have not been successful in increasing timber supply in regions where all timber supply still originates from the natural forest frontier because those frontier harvests are still less expensive than timber potentially coming from managed stands.

Numerous regulations have been tried as a means of ensuring improved timber supplies or restricting declining supplies. Reforestation requirements and harvest and shipment restrictions are the most common instruments. Invariably they have removed the incentives for future timber management and long-term timber supply declines as a result.

The experience with fuelwood has been similar, just as it has been for other marketed non-timber forest products as well. Production behaviour with respect to these forest products also follows the market pattern of our Figures 3.1-3.3 and these products are generally market-valued themselves - despite some assertions to the contrary. Local markets exist for most of these products in most regions where they are consumed. The markets may be thin and most households may collect for their own domestic consumption in preference to purchasing in the market. However, local markets generally do exist and whether local collectors choose to buy or sell instead of collecting for their own consumption is an economic decision. In fact, a few local residents do buy and a few do sell and the numbers who participate in the market change as the local prices for these products change.

Furthermore, household decisions regarding these non-timber forest products (NTFP) are market-related even for households that neither buy nor sell them. These households use their own labour to collect these resources and that labour is exchangeable for market-valued goods - sometimes as hired labour that earns a wage which can be used to purchase goods, sometimes as labour used in the domestic production of marketable agricultural products. Therefore, all households have incentives to apply their labour for collecting NTFP until the marginal value products of that labour approximates the marginal value product of their labour in those other, marketable activities. Therefore, it is not surprising that the instruments for improving the supply of NTFP, usually free or discounted seedlings or government-sponsored plantations, have a poor history of success. Where these products are valuable enough for local farmers and communities to plant and manage, the evidence is that farmers and communities do just that. In fact, two recent examinations of the global fuelwood situation have arrived at exactly this conclusion (Arnold *et al.*, 2002; Hyde and Kohlin, 2000).

Carbon sequestration and the mitigation of global climate change: The discussion on forestry and global climate change has two components: a) the effect of climate change on forests - which has to do with changes in the extent of forest cover in response to anticipated global climate change (Sedjo and Solomon, 1990) - and b) the mitigating effects of the forest on climate change. The latter is probably of greater interest. It can help preclude the former.

Increases in atmospheric levels of CO_2 cause global warming. On this most are in agreement. The level and importance of global warming, to date or in the foreseeable future, remain debatable issues (Mendelsohn and Neumann, 1998; Nordhaus and Boyer, 1999). The importance of the forest in mitigating global warming also remains a debatable issue.[11] However, it is clear that fossil fuel combustion and land use change (mostly agricultural conversion of the forest) release CO_2 into the atmosphere. The acts of harvesting timber and processing wood products also release CO_2, although not nearly at the rates of fossil fuel combustion and land use change. Indeed, wood processing releases only a portion of the carbon originally contained in a tree because so much is stored in the soil (roots, soil carbon, detritus on the forest floor), in the product (lumber) or in landfills (paper).

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[11] For example, see the discussion by F. Bohlin on the RESECON listserv June 25, 2000.

Reducing the rate of forest conversion to agriculture, particularly where conversion involves burning the forest cover, would decrease the rate of atmospheric build-up of CO_2. Growing trees in new plantations, harvesting and storing the final biomass would retain additional CO_2. However, growing trees and storing them on the stump would only yield a short-term increment to stored carbon because little additional storage occurs once the trees achieve maturity and the rate of tree growth declines. Nevertheless, additional tree planting and tree growth could be a means of buying time until world markets substitute other energy sources for fossil fuels.

The problem confronting any attempt to use trees to control global climate change is the mismatch between the non-exclusive global public impact and the more identifiable but still general location of the forest activities to control it. Protection from climate change is a public good in the broadest sense of the concept. Literally everyone everywhere benefits and the exclusion of anyone from the benefit is impossible. However, the depletion of mature natural forests and the loss of carbon stored in forests are most rapid at the forest frontier of the developing tropical countries - or at the margin of point D in Figures 3.1-3.3.

Various import restrictions, taxes and subsidies have been suggested for addressing the problem. Import restrictions such as certification are in favour today, but enforcing the forest management requirement for certification must be difficult while less expensive harvests from the natural forest remain available to local loggers. The natural solution for economists would be to tax the negative externalities, land conversion and fossil fuel consumption, while using tax revenues to subsidize the positive externality, forest management. Taxes on land conversion would be difficult because they largely occur in developing countries as a response to population growth, insecure land tenure or domestic development policy. Taxes on fossil fuel consumption have attracted more attention. Weimar (1990) showed that even a small tax on fossil fuel emissions comparable to 0.5 percent on the price of a barrel of petroleum would extract US$9 billion annually from the developed countries. However, we can anticipate that even this large sum would be rapidly dissipated in a) the transfers necessary to induce each of the many marginal users of the tropical forest to halt their extractive activities, b) the additional transfers necessary to encourage a significant expansion in tropical forest plantations, plus c) the costs of monitoring and enforcing (M&E) the promised behaviour by so many individuals spread over a vast forest landscape, as well as d) the administrative costs of the entire transfer.

For regions in all three stages of development, the costs of establishing and maintaining property rights C_r are greater than the market value of the resource at the natural forest frontier (point D). In the two less developed stages (Figures 3.1 and 3.2), these costs also exceed the value of marginal agricultural land use (from point B to point C). This means that M&E, for carbon sequestration or any other purpose, will be more costly than the market value of the protected resource. Few developing country resource management agencies will have the budgetary means to accomplish the M&E task under these conditions, while the local population will have competing private incentives to convert land and extract forest resources.

However, this same description also suggests an institutional solution: improved property rights. Any policy improvement that reduces the costs of establishing and maintaining property rights (reducing the height of function C_r) will extend the area of sustainable management (shifting B or B" to the right in the figures). This will decrease the level of forest conversion for regions in stage I, reduce the area of open access forest degradation for regions in stage II and expand managed forests for regions in stage III - thereby protecting threatened forests and stored carbon for regions in stages I and II and adding new forests and sequestering more carbon for regions in stage III. Two changes that could satisfy this description are the institutional adjustments that would permit local farmers to register their land use claims more easily and the transfers of these lands from public agencies to private land management. Successful community forestry is an example of the latter. General improvements in the overall macroeconomic policy environment are a third example. These are the kinds of improvements that increase the confidence of local land managers in their future prospects in general and cause them to extend their planning horizons and invest in conservation improvements in their land.

The second set of potential solutions is related to unplanned spillovers from agricultural activity. Decreases in the general class of incentives that induce agricultural expansion (e.g. crop subsidies) would decrease agriculture's infringement on the natural forest for regions in stage I (shifting point C to the left), decrease agricultural infringement on the degraded open access forest for regions in stage II (also shifting C to the left) and permit forest management to out-compete agriculture and expand into some former agricultural land for regions in stage III (shifting point B' to the left). Of course, altering these agricultural incentives will not be an easy task as strong political interests support them in almost all developed countries.

The issue of agricultural incentives becomes even more complex when it is recognized that some incentives, such as those that induce shifts to higher yield varieties, induce agricultural intensification. These would have the same beneficial effects on the forest and on carbon sequestration as those achieved by ridding the world of the incentives for agricultural expansion! Furthermore, agricultural intensification generally increases the demands for labour, raises rural wages and attracts workers away from the forest. This too saves on forest exploitation and controls the destruction of carbon already stored in mature trees. Therefore, any proposal to modify agricultural incentives for the purpose of improving carbon sequestration must be selective regarding the incentives in question. Some agricultural incentives reduce agriculture's competition with forests, extend forest area and improve carbon sequestration, and some decrease carbon sequestration (**Box 3.4**).

Erosion control and general watershed protection: Erosion control and watershed protection include all the wind, water and soil movement services of trees and watersheds; for example, water supply, storm protection - especially in coastal areas - and control of the upstream loss of soil nutrients and downstream effects of sediment deposition. Like carbon sequestration, watershed protection may be divided into two broad classes of activity - those requiring new conservation investments such as tree planting in shelterbelts to deter wind erosion and along streams and gulleys to deter water erosion and those maintaining the services of existing forested watersheds and controlling their deterioration.

The difference in economic effect is that watershed values are local, while carbon sequestration is a global public value. Depending on the watershed management activity, it can benefit an individual landowner who makes the conservation investment and improves the productivity of his or her own land, or it can benefit a range of downstream or other off-site land managers in the same watershed. In the latter case, when watershed management is a public good, it involves a smaller and more local public than the global society affected by carbon sequestration, the benefits of the activity are clearer and more immediate for the local community and obtaining support and compliance with local public management is somewhat easier than for carbon sequestration.

Box 3.4 – Carbon sequestration

The problem of protecting and expanding forests to improve carbon sequestration is complex. Our figures demonstrate the importance of focusing on shifts at the margins of forest land use. Both improvements in forest and agricultural property rights and incentives for agricultural intensification can create the desired forest protection and expansion. Decreasing the incentives for agricultural expansion has the same favourable effect, but this adjustment in incentives will be politically difficult to arrange. The potential of each of these policy or institutional modifications is greater than the various suggestions for carbon taxes and land use subsidies that tend to focus on the full forest rather than on marginal shifts in land use. Improvements in the property rights and in the selection of agricultural incentives are probably less expensive as well because carbon taxes coupled with land use subsidies would impose large administrative, monitoring and enforcement costs before they induced the desired behaviour from the many land users who are widely dispersed across a remote forest landscape.

Many of the first class of watershed management activity, those requiring new conservation investments, are responses to human development. They are a means of improving the productivity of existing (often agricultural) land uses. These investments typically occur on private lands - to the left of the intersection of the agricultural and forestry value functions with the rising property rights cost function in the three figures (points B or B"). Therefore, the increases in the manager's private long-term productivity are generally sufficient to induce private conservation investment. In fact, this observation conforms to the established analytical economic evidence for developed countries where land use rights are generally more secure (e.g. Crosson, 1985; Crosson and Stout, 1984). More recently, Yin (2000) and Alemu (1999) demonstrated its reliability in China and Ethiopia, respectively, once farmers in those countries received new longer-term land use rights. That is, economic reforms in the 1970s and 1980s in both countries gave farmers more secure and longer-term land use rights. The farmers responded by increasing various inputs, including trees to protect against wind and water erosion. Farmers in both countries obtained statistically significant increases in the levels of their private agricultural productivity due to the newly planted trees and related conservation investments.

The second class of watershed management activity protects the upland watershed or the coastal wetlands for the benefit of off-site residents of the same local area. Grazing livestock are a common source of upland erosion and downstream sedimentation [e.g. the Lake Victoria watershed in central Africa (personal communication with ICRAF) and the Philippines (Cruz *et al.*, 1988)]. Upland collection of fuelwood and fodder [e.g. Nepal's hills (Dangi and Hyde, 2001)] is a second source in some severely degraded forest areas. Even less intrusive activities like picnicking can also affect local water supplies to the extent that the city of Portland (Oregon, USA), for example, restricts all human activity on one critical section of its adjacent Mt. Hood watershed. Finally, logging and land conversion in many coastal areas have damaged local fisheries and decreased local protection against the effects of tropical storms. These examples are all characteristic of either the open access degraded forest or the boundary of the mature natural forest in Figures 3.2 and 3.3 (between points C and D). The costs of protecting these watersheds exceed the open access private (grazing, fuelwood collection, recreation, timber harvesting or land conversion) values on these lands. That is, in terms of the figures, the function C_r explaining the costs of property rights is above the agricultural and commercial value functions. Therefore, private management will be unsuccessful and only public monitoring and enforcement can ensure common watershed benefits for the local community.[12]

Where most or all members of the local community share in common watershed benefits, then the local residents also share a common incentive to protect the watershed and monitoring and enforcement may be a relatively simple matter. In other cases, where the local incentives are dissimilar, M&E will consume more resources and protecting the public benefits will be a more difficult task (**Box 3.5**). For example, some poorer households in the village of Basantapur in Nepal rely on the watershed for fuelwood, but their fuelwood collection degrades the watershed and increases the off-site flow of soil to the detriment of the agricultural productivity of the better-off households at the base of the watershed. This community's two interests in the watershed are in conflict and the community's forest guards have been unable to fully restrict access. The degradation of the watershed continues (Dangi and Hyde, 2001).

Box 3.5 – Erosion control and general watershed protection

Local land managers with long-term rights to the land internalize many watershed values. Other watershed values obtained from lands with less secure private claims or from public lands are more difficult to protect. They require M&E provided by a public institution representing those who benefit from the watershed's protection and their M&E will be least expensive and most successful where the affected local inhabitants share in similar benefits from the watershed.

Biodiversity and critical habitat: The protection of biodiversity is based on the idea that currently undeveloped, and even unknown, species possess characteristics of potential future value. Preserving their habitats helps preserve the species and the option to obtain future advantage from them once we learn more about them. Numerous examples demonstrate the great social and economic gain from preserving select species for which we had no prior scientific knowledge - although some doubt remains regarding the significance of the very probabilistic value to be gained from preserving unknown species in general (Simpson *et al.*, 1996).

If the importance of preserving species is accepted, then we know that the remaining natural forest, the forest beyond the frontier at point D in our three figures, contains most of the critical habitat. That is, natural forests (rather than forest plantations, other managed forests and trees and the degraded open access lands) must be the focus of most of our preservation effort because only these forests contain undisturbed habitat. Furthermore, among natural forests, the tropical moist forest contains more than a half of all species of flora and fauna, including many that are still unknown. This particular forest is all the more important because its marginal habitats are more threatened than those of either the tropical dry forests or the temperate and boreal forests. Therefore, the remaining mature tropical moist forest is an appropriate focus for a large share of our interest in protecting biodiversity.

The economic problem, once more, is the mismatch between the locations of the most concerned public and critical habitats. It contains elements of similarity with the carbon sequestration problem just discussed. That is, the greater wealth of the developed countries puts them in a better position to act on the potential future value of biodiversity and to pay the price necessary to protect endangered habitats, while the poorer local farmers and extractive users of tropical forests bear most of the costs of foregone development and habitat protection.

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[12] Nevertheless, Landell-Mills and Portas (2002) identify over 180 cases of markets for watershed services.

However, these elements of similarity diminish in importance when we focus on the physical sources of carbon and biodiversity. Carbon sequestration improves with the protection and expansion of forests and trees on all marginal forest lands. Most lands and trees are of similar value for carbon sequestration, but all lands and trees are definitely not similar for biodiversity. Biodiversity requires the protection of selective "islands" of specialized habitat. In terms of our three figures, these islands are often in the neighbourhood of point D or beyond it and the foregone future development opportunities associated with them are often smaller than even the current opportunities foregone when protecting marginally commercial forest lands for carbon sequestration at points B', B" and D. This means that many critical habitats remain unthreatened today simply because they are beyond the limits of access for either agricultural land conversion or extractive forest activities. Their inaccessibility protects them - for now. In other cases, some habitats can be protected in the normal course of management for other forest products and forest-based environmental services. Hyde (1991) showed that this is the case, for example, for many red-cockaded woodpecker habitats in the southern pine region of the US.

This leaves two fundamental problems for policy resolution, protecting that currently threatened habitat that is in competition with other, consumptive uses of the forest (or monitoring to ensure that its management and use is not competitive with the endangered habitat) and identifying additional specialized habitat that is inaccessible now and protecting it before it becomes threatened in the future. The currently endangered habitat will mostly often appear in the neighbourhood of point D in our figures. Protecting it requires the establishment of boundaries around the endangered habitat and the permanent exclusion of incompatible land uses. Excluding land conversion and agricultural use of the forest is a problem only for habitats at new frontiers in regions described by Figure 3.1. Therefore, reducing the incentives for agricultural expansion will only be important for the preservation of habitat in newly settled regions like some parts of the Amazon or the interior of Papua New Guinea.

Otherwise, for regions characterized by the more developed forestry described by Figures 3.2 and 3.3, the threats to diverse forest habitats originate from either the development of new infrastructure or extractive activities in the remaining natural forest. Changes in the infrastructure can affect all non-market forest values. Extractive activities in these natural forests are typically undertaken in a transitory manner by loggers or other operators who are here today and gone tomorrow. They have all the private economic incentives to harvest resources, often timber, and controlling their activities is a difficult task. It requires continuous monitoring of the boundaries of the protected habitats as long as the habitat is to be protected. Therein lies another problem. The resource management agencies of most developing countries do not have either the human or the financial resources to adequately ensure the protection of many critical habitats. Furthermore, most donor-assisted projects and most debt-for-nature swaps fail to include long-term continuing maintenance costs. In fact, long-term commitment to any single project is unusual in the practice of donor agencies. Therefore, the long-term protection of currently threatened habitat remains a largely unsolved policy problem and, in the presence of very limited resources, we have the additional problem of deciding which of many threatened habitats is most critical and most worthy of the long-term demands on these limited resources.

The second fundamental policy problem has to do with those critical habitats that are currently inaccessible and unthreatened. If the broad regions within which they are contained do develop, then some of these habitats may not be threatened in the future either. That is, local forests tend to recover after regions develop beyond some level. However, many critical habitats could be lost forever before the regions around them attain this level of development. Can we identify those threatened habitats and preserve them before they become commercially accessible and are lost forever?

Identification is a task for field research and it is one reason for the current interest in developing 'indicators' of forest quality. As current opportunities for biotechnology expand, the values of some endangered habitats may become clearer to private investors and those private interests may undertake the effort to save some of them. Otherwise, this too is a public problem and one that the donors and public research institutions of the developed countries may be particularly well suited to address. Once the public researchers do identify critical habitat, however, policy-makers are still left with the previously discussed and largely unsolved task of finding a publicly-funded means for excluding extractive uses of the forest from the critical habitat.

Box 3.6 – Biodiversity and critical habitat

The preservation of critical forest habitats for endangered biodiversity is a difficult and largely unsolved problem. It requires identifying the critical habitats and excluding all competitive uses from them. Reducing the incentives for forest land conversion to agriculture will help protect some critical habitats in select regions of new development. However, in these and all other regions, the more fundamental problem is finding the human and financial resources to permanently exclude consumptive activities from these habitats. This is a tall order. The governments of the tropical countries that host the largest numbers of threatened species have very limited resources for monitoring and enforcement and the developed country donors that could assist are not in the habit of making the long-term commitments necessary to protect these habitats. Moreover, the problem will only compound in any region where local development is associated with further clearing of the forest.

Finally, *ex situ* preservation can be a partial solution for long-term preservation. *Ex situ* preservation is the off-site storage of the endangered biological material. Once the threatened flora or fauna is identified, its germplasm can be catalogued and stored, preferably in a public institution that will maintain the biological material for the benefit of all the world's people in this as well as future generations. Zoological parks are one example. In addition, some institutions in the CGIAR system of international agricultural research stations maintain cold storage banks of germplasm. Gene banks, however, are static institutions. They fail to capture and preserve dynamic genetic evolution. They can be important contributors to the preservation of existing biodiversity while we search for ways to identify and permanently protect critical forest habitat (**Box 3.6**).

Tourism: A broad range of people obtain the benefits of tourism and a broad range of forested sites provide for it. Those who benefit range from wealthier global tourists to local picnickers and others just looking for a pleasant moment in a natural setting. Site characteristics range from unique global resources like Yellowstone, the Serengeti or Sagarmantha to pleasant local forested groves and even village parks. The unique sites can provide a focus for substantial demands for tourist support services like restaurants, motels, guide services and outdoor equipment shops; and these can be important sources of hard currency for the local economy.

Once more, the economic problem is either one of protecting "islands" of specialized forested sites within lands that are valuable for other, commercial uses (out to point D in our figures), or identifying commercially inaccessible forest lands (beyond D) that are uniquely attractive for nature tourism and protecting them before they become accessible for those commercial uses. For the most unusual sites, fees may be charged at points of limited access and the revenue from them used to establish boundaries and to monitor and enforce the exclusion of undesirable uses of the park, as well as the provision of tourist services. For example, Kenya charges an increased visa fee for national entry for global tourists, Nepal charges for trekking permits which may be obtained at the offices of guide services and many national parks with natural boundaries charge a gate fee.

There are two problems, however, even in the case of these unique resources. First, the fee is general. It makes no distinction for particular resources or specialized services within the region covered by the fee. For example, fees collected at national borders do not distinguish between different parks within a country or between particular resources within a park. Therefore, there is no market signal that assists managers in the allocation of revenues among numerous resources and services. Sometimes this problem can be addressed by placing the general management of all resources under one integrated operation - a national park service, for example - and competitively allocating concessions for specialized services like hotels and guides with each park boundary.

The second problem exists even when this first problem can be solved. While tourists from long distances can be excluded unless they pay the costs of park management, the exclusion of local users is more difficult. Therefore, monitoring and enforcing restrictions against competitive local uses of the unique resource is more difficult. Poaching within East Africa's game parks and timber harvesting within the boundaries of southeast Asian natural reserves are examples. A partial solution to this problem can often be obtained by establishing an interest in the park's tourist services within the local population. When some of the local population gain, as from employment in park concessions or by providing guide services, then local citizens have their own incentives to assist in the M&E of park boundaries and management and their own incentives to discourage their neighbours' violations of the park boundaries. Even this solution, however, does not prevent all local trespass.

For those forest resources that are not unique and do not attract global tourists the most common non-consumptive users are members of the local community. Local institutions are generally better suited to manage these resources and many successfully protected village parks and forest sanctuaries have been observed around the world. The employees of local institutions have a better understanding of both the patterns of demand on these resources and the arrangements of their most appealing physical characteristics. Therefore, the management costs of a local institution will be lower than for a comparable level of management by a national authority. Nevertheless, these costs will still be positive and, since the exclusion of local users is difficult, the local community must bear these costs either as part of its community budget or as part of a commonly respected decision not to exploit the extractive resources within the park (**Box 3.7**).

Box 3.7 – Tourism and other forest-based recreation

The protection of those forest resources that are attractive for environmental tourism is a property rights problem, just as protecting the forest for each of the previous non-market valued uses was also a property rights problem. The two steps to addressing this problem are i) identifying the resource to be protected and ii) establishing the appropriate public institution for its management. For resources that attract global tourists, a national authority will generally be the most successful manager, but it will have to provide some local incentive for park management - or the park will suffer the trespass of local users with competing market-based values. For forest resources that only attract regional or local tourists, then regional or local institutions will be more successful at excluding competitive market-valued uses.

CONCLUSIONS

It should be clear from this review that various selective policies can have favourable consequences for the protection of particular forest resources. For example, reducing forest taxation and increasing forest incentives improve the opportunity for managed forests - but only in those regions like the southern US where the products of managed forests are financially competitive with extracted products from the natural forest. It should also be clear that some policy instruments have not had the desired effects - particularly on timber supply. For example, reducing forest taxation and increasing forest incentives has no effect whatsoever on regions like Alaska, Siberia or many tropical countries where managed forests are not yet financially competitive with extraction from the natural forest. And regulations that control harvest and shipment may even decrease the natural market incentives for both the development of managed forests and the protection of natural forests.

The most important lesson, however, is that it is crucial to consider the policy objective first, then to think about the best way to achieve it. Often the best means of achieving a forest policy objective is by modifying activity in an adjacent sector like agriculture, or by improving the local institutions providing for property rights of the land that provides the forest resource in question. Very often modifications in road design improve the likelihood of achieving a particular forest policy objective as well.

In sum, it should be clear that policy spillovers from other sectors of the economy often have even greater impacts on forest resources than forest policies themselves. Furthermore, perhaps the general problem of rural poverty is the greatest source of deforestation and loss of the various forest resources. Therefore, general economic development and associated improvements in personal economic welfare may have greater positive effects on the protection of these resources than any set of selective and specific policy or institutional improvements. The focal objectives of modern forest policy are sustainability and the control of forest degradation and deforestation. Sustainability is achievable if we define it as "sustainable options" or "maintaining, in perpetuity, options for all different uses of forest resources, market and non-market, consumptive and non-consumptive, known and unknown." This definition would permit some shifts of forest land to agriculture, from agriculture back to forestry, or from natural forest to managed forest, so long as the land's productive base and the genetic base of the forest are maintained. Values will change with time and preferred arrangements of land use will change with them, but we can ensure that changes in land use do not destroy opportunities for new and different land or resource uses in the future.

This perspective of sustainability is consistent with minimizing the area of degraded open access forest while locally regulating specific erosive watersheds, critical habitats and important aesthetic resources, both within and outside the degraded area. Minimizing the area of degraded forest is the objective because its elimination is impossible as long as secure property rights impose a cost and the public agencies responsible for managing the degraded open access area have limited budgets. The primary means for minimizing the degraded area are to reduce the cost of property rights and attract some human activity away from the forest. The first requires finding the best bundle of property rights and the institution that can provide this bundle at least cost. The second implies finding improved employment opportunities outside the forest for the lowest wage users of the forest. Once more, policies that improve general rural economic welfare may have the most beneficial impacts on the forest and, as a corollary, policies that are detrimental to the rural poor may have the greatest negative influences on sustainability and the control of deforestation.

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Chapter 4

Monitoring and measuring cross-sectoral impacts with environmental accounts

Glenn-Marie Lange

INTRODUCTION

Sustainable forest management has been hampered by a lack of information about the multiple economic contributions of forests and how the goods and services provided by forests are linked to the rest of the economy. While there is information about the economic value of commercial timber, many other contributions of forests are often missing from national accounts, our primary source of information about the economy. Examples of these contributions include non-marketed forest goods and services that contribute to the livelihoods of rural populations, the use of forests for tourism and recreation and ecosystem protection services such as watershed protection for agriculture, fisheries and municipal water supply, or carbon storage.

To provide the information to build broad-based, cross-sectoral forestry policy, information is needed about the value of forest ecosystem benefits and integrating environmental and economic information. The United Nations, along with other major international organizations (OECD, Eurostat, World Bank, IMF), has prepared a handbook for environmental accounts, the System of Environmental and Economic Accounts (SEEA) (UN, 1993; 2001). Environmental accounts are widely recognized as providing such a framework: they bring together economic and environmental information in a common framework to measure the contribution of the environment to the economy and the impact of the economy on the environment. The accounts provide both indicators for monitoring sustainability as well as detailed statistics for use as a planning tool. Detailed statistics enable governments to set priorities, monitor the environmental impact of economic policies more precisely, enact more effective environmental regulations and resource management strategies and design more efficient market instruments for environmental policies.

The purpose of this report is to describe the potential use of SEEA for measuring the cross-sectoral benefits of forestry to other sectors of the economy and identifying impacts on forestry from non-forestry sector policies. This report will identify the relevant components of SEEA and develop a framework that can be used for economic analysis of the impact of cross-sectoral policy linkages and, hence, contribute to better sectoral and macroeconomic policy-making by governments and, ultimately, to more effective forest conservation.

OVERVIEW OF ENVIRONMENTAL ACCOUNTS

Over the past few decades, most countries have come to embrace the notion of sustainable development, popularly expressed by the Brundtland Commission Report, *Our common future*, as '...development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1987). The search for ways to operationalize this notion has focused, in part, on national economic accounts: incorporating the role of the environment and natural capital more fully into the conventional system of national accounts (SNA) through a system of satellite accounts for the environment. SNA (UN, 1993) is particularly important because it constitutes the primary source of information about the economy and is widely used for analysis and decision-making in all countries. However, SNA has had a number of well-known shortcomings regarding the treatment of the environment.

With regard to forestry, SNA has treated cultivated forests and natural forests quite differently. For cultivated forests, SNA records both production and changes in the forest stock so that the consequences of depletion or afforestation are accounted for. For natural forests, however, SNA records only the income from logging, but not changes in natural forest stocks. This can result in quite misleading economic signals about changes in a natural forest: income from over-exploitation would be recorded as part of GDP, but the corresponding depletion of the forest stocks would not be recorded. Similarly, the benefits from afforestation would not be recorded. The 1993 revision of SNA addresses some of these problems, notably by expanding the asset boundary to include a broader range of natural assets such as natural forests. Even with this expanded coverage, significant gaps remain. Non-marketed products are critical to rural livelihoods in developing countries, yet they are often not included in the national accounts. In principle, SNA includes such products, but measurement difficulties have limited implementation in many countries.

Many of the non-market services from forests are wrongly attributed to other sectors of the economy or omitted. The value of forest services provided as intermediate inputs to other sectors, such as livestock grazing or tourism, are attributed to the using sector, not to forestry, thereby underestimating the economic value of forests. Ecosystem services such as watershed protection and carbon storage may not be represented at all. Land and land use are not represented in SNA in the detail necessary for effective policy analysis. SEEA was developed as a set of satellite accounts to SNA to address these gaps (UN, 1993; 2001).

Environmental and natural resource accounts have evolved since the 1970s through the efforts of individual countries and practitioners, each developing their own frameworks and methodologies to represent their environmental priorities. Since the late 1980s, a concerted effort has been under way through the United Nations Statistics Division, Eurostat, OECD, the World Bank, national statistical offices and other organizations to standardize the framework and methodologies. The United Nations published an interim handbook on environmental accounting in 1993 (UN 1993b), *Handbook of integrated economic and environmental accounting*; this handbook is currently under revision.

Structure of SEEA

As satellite accounts, SEEA has a similar structure to SNA. SEEA consists of stocks and flows of environmental goods and services. It provides a set of aggregate indicators to monitor environmental-economic performance at the sectoral and macroeconomic levels, as well as a detailed set of statistics to guide resource managers towards policy decisions that will improve environmental-economic performance in the future. The definition of environmental goods and services in SEEA is much broader than SNA, attempting in principle to measure total economic value, not just market values. SEEA has major four components:

- Asset accounts, which record stocks and changes in stocks of natural resources.
  Forestry asset accounts typically include stocks of standing timber, forest balance accounts, forest land accounts, land use accounts and carbon storage in forests.

- Flow or production accounts for materials, energy and pollution which provide information at the industry level about the use of energy and materials as inputs to production and final demand and the generation of pollutants and solid waste.
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  Forest flow accounts include supply and use accounts for detailed forest products (wood and non-wood, marketed and non-marketed) by sector, which are linked to the input-output (IO) tables and social accounting matrices (SAMs) used in economic models. Forest flow accounts include measures of forest ecosystem services. The forestry accounts also include flow accounts for other resources that may be relevant to forestry management, such as energy accounts, pollution (e.g. acid rain affecting forests) and environmental degradation (e.g. soil erosion from logging) accounts.

- Environmental protection and resource management expenditure accounts, which identify expenditures in the conventional SNA. For forestry, these accounts include forest management expenditures by government, environmental protection expenditures by public and private sectors, as well as user fees and taxes paid by forest users to the government.

- Environmentally-adjusted macroeconomic aggregates, which include indicators of sustainability such as environmentally-adjusted gross domestic product (GDP), net domestic product (NDP), national savings or national wealth. For this component of SEEA, forestry accounts provide the addition to GDP of unvalued forest goods and services, the subtraction from NDP of the economic cost of deforestation or loss of forest services due to a change in management and the contribution of forest assets to national wealth.

SEEA includes both physical and, to the extent possible, monetary accounts. When dealing with non-market goods and services, however, valuation can become difficult. However, there are a number of widely-used economic valuation techniques that may be applied.

Advantages of SEEA

There are two features that distinguish SEEA from other databases about the environment: integration of environmental data with economic accounts and comprehensive treatment of all important natural resources, linking them with the economic sectors that rely on them, directly and indirectly, and those sectors that affect them. In contrast to other environmental databases, the purpose of SEEA is to directly link environmental data to economic accounts. SEEA achieves this by sharing structure, definitions and classifications with SNA. The advantage of SEEA is that this kind of database provides a tool to overcome the tendency to divide issues along disciplinary lines, in which analyses of economic issues and of environmental issues are carried out independently of one another.

Regarding the second distinguishing feature, SEEA includes all the important natural resources, linking them with the economic sectors that rely on them, directly and indirectly, as well as those sectors that affect them, a feature that makes it ideal for addressing cross-sectoral issues such as forestry management. SEEA includes forest accounts as well as all other critical environmental stocks and flows related to forestry, such as land and ecosystem accounts, energy accounts, pollution and material flow accounts, etc.

For issues such as forest management, the advantage of the SEEA approach is clear. It is not possible to promote sustainable forestry purely from the narrow perspective of managing forests; rather, an economy-wide approach is needed that can identify benefits that forests provide to other sectors and threats to forests from non-forestry policies. SEEA makes possible joint analysis of economic policies and their impact on all relevant environmental variables.

Policy uses of forestry accounts

For all resources, policy analysis and decision-making take place on three relatively distinct levels: the local or company level, the sectoral or industry level and the macroeconomic (national) or regional level. The contribution of SEEA to policy analysis has been primarily at the sectoral and macroeconomic levels. At the macroeconomic level, SEEA is useful as a planning tool to coordinate policies across different line ministries and assess cross-sectoral impacts, weighing alternatives and trade-offs among sectors.

SEEA accounts for the value of non-marketed goods and ecosystem services of forests, which show how many sectors outside traditional forestry benefit from forest ecosystems. This information is critical in developing cross-sectoral policy-making institutions necessary for sustainable development. Such institutions would involve stakeholders from all sectors that benefit from forestry, such as rural development, tourism, agriculture, fisheries, municipal water supply and others. Even though agriculture is a main competitor with forests for land use in many countries, agriculture also relies on forest ecosystems in ways that are not often included in policy analysis, such as watershed protection.

The applications of SEEA will be discussed in greater detail below. However, a short summary is provided here. The contributions of SEEA fall into two categories: improved measurement of the value of forest ecosystems to all sectors of the economy and improved management of forestry by modelling economy-wide linkages to forestry.

1) Improved measures of the economic benefits from forest ecosystems to all sectors of the economy:
    - Total economic value of forestry and forest land, including the non-market values of forest goods and services missing from national accounts.
    - Cost of deforestation and land conversion, including losses of ecosystem benefits affecting non-forestry sectors.
    - Distribution of benefits from forestry among different groups in society, e.g. commercial, artisanal and subsistence users of forests, as well as other users such as tourists, regional interests (local and regional environmental protection services) and global interests (carbon storage, biodiversity protection).
    - Economic linkages, upstream and downstream, between the forestry sector and other sectors of the economy

2) Improved macroeconomic management that takes into account impacts on forestry:
    - Measurement of the links between economic activities and demand for resources, including forest goods and services, land and energy.
    - Impact of non-forestry sector policies on forestry.
    - Impact of macroeconomic policies on the forestry sector, both direct and indirect effects.

- Measurement of environmental externalities caused by forestry and their impact on other sectors, as well as externalities generated elsewhere in the economy that affect the capacity of forests to provide critical goods and services.

USE OF SEEA FOR FORESTRY POLICY ANALYSIS

This section discusses the experiences of countries implementing SEEA and reviews the policy applications of the forestry accounts. Policy use so far has often been limited to an assessment of timber asset value and some valuation of non-timber benefits, but there are a growing number of studies that attempt to account for a wider range of non-market forest goods and ecosystem services on which other sectors depend. In many developing countries, the original motivation for forest accounts was to estimate the cost of deforestation and to assess whether rapid economic growth in countries like Indonesia was achieved by the liquidation of natural capital. A new interest in forest accounts has emerged from international efforts to reduce greenhouse gas emissions. One greenhouse gas mitigation measure is the creation of a market for carbon sinks in tropical forests. Some countries already receive payments for this service and the market may grow once international agreement is reached.

There are some cases where the forest accounts have been used for analysis of macroeconomic policies or national development strategies, but this is still a relatively new area for SEEA. Several examples will be described in detail. There is also a long tradition in forestry economics of input-output-based impact analysis to assess cross-sectoral linkages. While these studies are typically not based on SEEA, they can benefit from the extended data that SEEA provides. This approach, and how it can be improved with SEEA forestry accounts, is described.

Country experiences with forest resource accounts

Environmental accounts have been constructed for forest resources more often than for most other resources. The earliest set of forest accounts was constructed by Norway in the late 1970s. At that time only physical asset accounts for standing timber were constructed (Alfsen *et al.*, 1987). Fuelwood was included in the supply and use table[13] for energy, which is widely used in Norway's multi-sector macroeconomic planning model. Norway also constructed land accounts, which include information about forested land and land use by different sectors. Since that time, many other countries have constructed forest accounts and these have expanded to include monetary asset accounts for standing timber as well as non-timber goods and services.

Table 4.1 shows countries that have constructed forest accounts and the type of amenities included in the accounts. This table is limited to those countries with formal accounting programmes sponsored by government or non-governmental agencies in cooperation with governments. Forestry accounts are more common in developed than in developing countries. Since 1995, Eurostat has had an ongoing programme to develop forest resource accounts and many of the participating countries have developed extensive accounts. There are also many additional academic studies and one-off studies by governments or international agencies that are not shown here; some of these will be discussed later in the section on policy analysis. For an exhaustive review of all forest accounting efforts through 1997, see Vincent and Hartwick, 1997.

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[13] The supply and use table is part of SNA and shows the supply of a product by each industry and the use of that product by each industry; it is the basis for the input-output table.

Table 4.1 - Forest accounts constructed by selected countries

	FOREST ACCOUNTS				FOREST-RELATED ACCOUNTS			
	Timber		Non-timber goods and services					
	Asset accounts, physical and monetary	Supply and use table for wood products	Carbon storage	Other goods and services	Land	Energy	Water	Pollution and env. degradation
Developing countries								
Brazil	X							
Chile	X							
Costa Rica	X							
Indonesia	X		X					
Mexico	X				X	X		X
Philippines	X		X	X	X	X		X
Thailand	X							
South Africa	X		X	X			X	
Swaziland	X		X	X				
Developed countries								
Under Eurostat programme								
Austria	X	X	X	X	X	X		X
Finland	X	X	X	X	X	X		X
Denmark	X	X	X	X	X	X	X	X
France	X	X	X	X	X	X	X	X
Norway	X	X	X	X	X	X		X
Sweden	X	X	X	X	X	X	X	X
Spain	X	X	X	X	X	X		X
Germany	X	X	X	X	X	X	X	X
Italy	X	X	X	X	X	X		X
Other developed countries								
Canada	X	X	X	X	X	X	X	X
Australia	X	X	X	X	X	X	X	X
New Zealand	X	X	X	X	X	X		X

Note: Countries included here have on-going accounting programmes by government, or non-governmental agencies in cooperation with governments. There have been many additional academic studies and one-time studies by governments or international agencies. See Vincent and Hartwick (1997) for a review of these studies.

The forest accounts for all countries include timber asset accounts in physical and monetary terms. Forests are disaggregated in different ways depending on the policy issues and characteristics of forests in each country. Virtually all forest accounts distinguish cultivated and natural forests and disaggregate forests by major tree species. Many developing countries limit timber accounts to commercial timber production, but are beginning to add non-commercial timber production and use of non-wood products. None of the developing countries regularly constructs detailed supply and use tables for timber and wood products. The non-timber benefit most commonly included in forest resource accounts is carbon storage. Virtually all developed countries include carbon storage accounts, but this practice is less widespread in developing countries. In most instances forest accounts have been constructed as part of a broader environmental accounting effort that includes other natural resources. In the next part of this section forest accounts will be examined in greater detail for two countries: Sweden and South Africa.

Use of forest accounts for policy analysis

Forest accounts have been used by policy-makers to provide a better estimate of the total economic value of forests and, to a lesser extent, to understand the impact on forestry of other sectors of the economy. The major concerns addressed by forest accounts include the following:

Concerns about the "true" economic value of forests

1. What is the full economic value of forests, including non-market values, and who are the beneficiaries?
2. Is economic growth based on the depletion of forests? What is the cost of deforestation?
3. Are policy decisions based on the total economic value of forests, taking into account linkages throughout the economy and impacts on all stakeholders?

Concerns about the impact on forests of non-forestry policies

4. What are the economic trade-offs among competing sectors or optimizing forest ecosystems that produce benefits to multiple stakeholders?
5. How will economic growth, macroeconomic and other policies affect forests?

The use of forest accounts to address each of these issues is discussed below.

What is the full economic value of forests?: Forest management and decisions about forest land conversion, especially in developing countries, are often based on a limited range of economic, mostly timber, values. Better understanding of the full range of goods and services supplied by forests to many other sectors is essential for the optimal utilization of forests and may provide an economic rationale for conserving forests. This was one of the motivations for the South African forestry study described below. The estimated values for Sweden and South Africa indicate that non-timber values to other sectors can be greater than the value of commercial timber harvest. Sweden's forestry accounts are part of a well-established, comprehensive programme of environmental accounting that includes detailed land and ecosystem, energy and pollution accounts. The forestry accounts in South Africa are part of a new environmental accounting initiative by Statistics South Africa and the Department of Environment and Tourism. Much work is also being done on water accounts, which is critical for South Africa. Land and ecosystem accounts and energy and pollution accounts have not been constructed, although there are extensive databases which could be used to construct such accounts.

The Swedish and South African accounts are fairly similar in some ways: both focus on timber accounts, non-timber goods, carbon storage and recreational benefits. But the accounts differ in terms of forest classification and some of the non-timber services of forests (**Tables 4.2 and 4.3**). A short time series of forest values is available for Sweden and it shows remarkable stability over a six-year period. Only one year's values are available for South Africa, so it is not possible to assess what may be happening to these forests over time.

The Swedish forest accounts include stocks of standing timber and area of forest land disaggregated by several characteristics, such as major tree species, availability for wood supply and natural or planted forest. Detailed supply and use tables for timber are also constructed. Non-timber goods include wild foods (berries, mushrooms, game, etc.), some of which are marketed and some consumed directly by households, but which account for less than 5 percent of the total value of forests. Non-timber services include carbon storage, recreation and several protective functions (biodiversity, soil protection and noise abatement), as well as two indicators of overall health: defoliation of trees and changes in forest ecosystem land area and productive capacity. Recreational use of Swedish forests is the single most important forest value, greater than the value of timber harvest. The value of carbon storage is roughly half the value of timber[14]. The forest protective services for soils and noise abatement are negligible. Of course, there are some forest services that could not be valued, but these accounts provide a reasonable estimate of the magnitude of non-timber forest values. (For a discussion of valuation methodologies, see Norman *et al.*, 2001.)

Table 4.2 - Value of forest goods and services in Sweden, 1993 to 1999
(millions of euros)

	1993	1995	1999
Timber harvest	2080	2540	2370
Non-timber goods (wild plants and game)	273	233	225
Forest services			
Recreation	2370	2370	2370
Protection of soils, noise abatement	20	20	20
Carbon storage	1050	630	810
Sub-total	3440	3020	3200
Total value of forests	**5793**	**5793**	**5795**
Parts of forestry accounts measured in physical units only:			
Maintenance of biodiversity			
Defoliation of trees			

Source: Norman *et al. (2001).*

South African forests are classified by three major types: cultivated forest plantations that provide most of the country's commercial timber and tree products, natural forests and woodlands that are used by rural communities, and fynbos woodlands, which is a unique biome in South Africa, the Cape Floral Kingdom (Hassan, 2002). Forests in national parks and protected areas have not yet been included in the accounts. Stock accounts for standing timber have only been constructed for cultivated forests. The flow accounts include production, but not detailed supply and use accounts. In South Africa, commercial timber harvest accounts for well under a third of forest value. The largest single forest value is non-market goods from natural forests, which are used mainly by traditional rural communities.

Non-timber services include carbon storage of cultivated forests, livestock grazing in natural forests and fynbos, recreational services of fynbos woodlands and the pollination service provided to agriculture by wild bees in fynbos woodlands. Pollination and livestock grazing are examples of inputs provided to agriculture at no charge and whose value is embodied in the value of agricultural output, rather than woodlands. Combined with livestock grazing, the goods and services in natural forests account for over half of the total forest value. In contrast to Sweden, recreational use of forests is very small and limited to fynbos woodlands; tourism in cultivated forests and natural woodlands is negligible. No doubt this picture would change if the recreational value of forests in national parks and protected areas, which are major domestic and international tourism sites, were included in the forestry accounts.

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[14] Several methods were used to value carbon storage. The value reported here is one of the lower values and is the one favoured by the authors.

The forestry accounts measure an important environmental externality: the cost of water abstraction by cultivated forests. Cultivated forest plantations of exotic species (mainly pines and gums) absorb much more rainfall than native species, thus reducing run-off. South Africa is a water-scarce country so this excess water abstraction has a cost in terms of foregone use of water by downstream users, amounting to about 12 percent of the value of commercial timber harvest. In South Africa, this externality is being treated quite seriously. The new South African water policy has proposed charging forest plantations for this water abstraction externality.

Table 4.3 - Value of forest goods and services in South Africa, 1998
(millions of rands)

	Cultivated forests	Natural forests	Fynbos woodlands	Total
Commercial timber harvest	1856	NA	NA	1856
Non-market timber and non-timber goods (wild plants, game, medicines)	NA	2613	79	2692
Forest services				
	NA	NA	29	29
Recreation	NA	1021	NA	1021
Livestock grazing	NA	NA	786	786
Pollination services	-225	NA	NA	-225
Reduction of rainfall run-off	120	360	NAV	480
Carbon storage				
Sub-total	-105	1381	815	2091
Total value of forests	**1751**	**3994**	**894**	**6639**

NA: not applicable
NAV: not available
Source: (Hassan, 2002)

Is economic growth based on the depletion of forests and other renewable resources?: In the past, loss of natural forest was not included in national accounts. Forest accounts were constructed to adjust the commonly used measures of macroeconomic performance - GDP and NDP - for depletion of natural forests and it was hoped that these environmentally adjusted measures of GDP and NDP would provide more accurate indicators of sustainable development. This type of application was typical of early work in developing countries and some of the results are shown in **Table 4.4**. In some instances, Indonesia and Costa Rica, the cost of deforestation was quite high. In Sweden, this value is quite small.

The World Bank includes a crude estimate of forest depletion (timber value only) in its indicator of sustainable development, Genuine Savings (Kunte *et al.*, 1998). Genuine Savings attempts to adjust conventional net domestic savings for environmental depletion and for investment in human capital. It subtracts from net domestic savings an estimate of depletion of forest and minerals, adds expenditures on education (viewed as investment in human capital) and subtracts a notional damage charge for carbon emissions. In the World Bank estimates, forest depletion reduced net domestic savings by 20 percent in low-income countries, mostly in Asia (Hamilton, 2001).

Table 4.4 - Costs of forest depletion and degradation in selected countries

Country	**Change in GDP/NDP**
Indonesia, 1971-1984	-5.4% of GDP
Costa Rica, 1970-1989	-5.2% of GDP
Philippines, 1988-1992	-3.0% of GDP
Malaysia, 1970-1990	-0.3% of GDP
Sweden, 1998	-0.03% of NDP

Sources: Indonesia: (Repetto, 1987); Costa Rica: (Repetto *et al.*, 1989); Philippines: (NSCB, 1998; Delos Angelos and Peskin, 1998; Domingo, 1998); Malaysia: estimated from (Vincent, 1997); Sweden: (Ahlroth, 2000a).

There is increasing interest in measures of changes in total wealth (produced capital plus natural capital and human capital) as an indicator of sustainable development (see, for example, Dasgupta and Maler, 2000). Some countries, such as Australia and Canada, are beginning to publish figures for total national wealth that include non-produced assets such as natural forests. In Australia and Canada, the total economic value of natural capital has been quite small and the share of natural forests, valued for timber only, was extremely small (Lange, 2001a, 2001b). However, in some developing countries, such as Malaysia (Vincent, 1997) and the Philippines (NSCB, 1998; Lange, 2000), the asset value of forests can be significant.

Who benefits from the goods and services provided by forests?: The question of who benefits from forests is increasingly important for development policy. This issue has two dimensions, an inter-generational one and an intra-generational one. Inter-generational equity concerns the forest wealth left to future generations - whether society is liquidating its natural capital to pay for current consumption or using it sustainably. This has already been discussed above.

Intra-generational equity concerns the distribution of benefits among different social groups in the present generation. For example, commercial timber mainly benefits large- and small-scale commercial timber producers. In developing countries non-marketed goods and services may be critical to rural livelihoods, even when the economic value of such products may be low relative to commercial timber. The services of forests may benefit local or regional communities (e.g. livestock grazing, flood protection, prevention of soil erosion) and even national and international communities (carbon storage, biodiversity protection). In the South African study, the non-marketed value of natural woodlands makes a contribution to rural livelihoods that is greater than the value of commercial forest plantations.

Forest accounts have not been used to address systematically the issues of equity and poverty, but this use of the accounts is likely to become important in future work (e.g. Lange and Hassan, 2002). Some observations may already be made on the basis of the Swedish and South African forest accounts. The forest accounts indicate that households are major direct beneficiaries, rather than commercial operators. In Sweden, one cannot determine from the information available which social groups benefit most. In South Africa, the poor rural households depend on forests for subsistence livelihoods.

Forest valuation and trade-offs among competing uses of forests: The majority of forest accounting initiatives aim to improve the understanding of the value of forests. There is a broad literature of cost-benefit analyses to determine the optimal use of forests among competing users, often providing a strong economic argument for forest conservation. Although these cost-benefit studies do not typically make use of SEEA, they are examples of the kind of policy analysis that SEEA can support, as the example for Malaysia, discussed below, indicates.

Shahwahid *et al.* (1999) analyzed the trade-offs among three alternative uses of forest land in the four catchments that make up Hulu Langat Forest Reserve in Malaysia. The Forest Reserve is currently used for catchment protection, providing soil protection and water to a dam for hydroelectric power and water regulation downstream. The alternative uses are two different methods of logging: conventional logging, which provides the most timber but results in high levels of soil erosion that reduce dam capacity, and restricted-impact logging, which provides less timber than conventional logging but also less soil disturbance. The study found that the economic returns to timber alone, under either logging method, were not as great as the economic value of forests from catchment protection. Further analysis showed that a combination of restricted-impact logging and reduced catchment protection provided the greatest economic value. The relatively small reduction of forest catchment protection services from logging was compensated for by the timber value of logging, as long as the restricted-impact method was used.

Some important additional forest benefits were omitted from the analysis - recreation and tourism, biodiversity, non-timber forest products and other protective services for downstream activities. The provision of these additional benefits is compatible with catchment protection, but would be reduced by logging; if they had been included, the optimal use of forest land might not have included even restricted-impact logging. The SEEA forest accounts would provide this kind of information for local development planning.

Influence of macroeconomic and non-forestry sector policies on forests: Two different methods have been used for analyzing cross-sectoral impacts on forestry: regression analysis and simulation modelling. SEEA has not been used specifically for regression analysis, although it can provide information about forest and land use often used in these analyses. Section 4.5 describes the relationship between SEEA and forestry indicators that may be used for regression analysis. Economic simulation models provide another approach to understanding cross-sectoral impacts and it is perhaps here that SEEA can make a significant contribution. Several versions of simulation modelling are reviewed, from relatively simple forestry multiplier analysis to more complex general equilibrium analysis based on hybrid forestry IO/SAM models. This section provides an overview of forestry multiplier and impact analysis, then describes work done using forestry accounts to assess the potential for carbon storage both from the point of view of the potential provider of forest carbon storage and the potential purchaser of carbon storage services. Finally, studies in the Philippines and

Indonesia that explicitly combined environmental accounts with economic models to address cross-sectoral policy linkages to forestry are reviewed (**Boxes 4.1 and 4.2**).

Box 4.1 - Philippines: environmental-economic modelling and forestry

In the early 1980s the Philippines experienced a debt crisis and the World Bank and IMF stepped in with stabilization and structural adjustment programmes. Stabilization programmes are short-term programmes to address macroeconomic imbalances such as unmanageable balance of payments deficits. They usually reduce government expenditures considerably, shift resources into the production of internationally tradable goods and introduce measures to refinance debt. Structural adjustment programmes (SAP) have a longer-term objective of restoring sustainable economic development, often through the promotion of economic liberalization that targets exchange rate and trade policies, the size and composition of government expenditures and the extent of government control over the economy. The literature on underlying causes of deforestation suggests that such programmes might create incentives for more intensive, unsustainable exploitation of forests and other natural resources, which would be exported in order to pay off the debt, or at least interest on the debt.

There have been many analyses of the economic impacts of stabilization and SAP, but a purely economic model cannot inform policy-makers about the impact on the environment. Similarly, there have been numerous studies of the changing condition of the Philippines' forests, but they have not been linked to the impacts of macroeconomic policy changes throughout the economy.

Cruz and Repetto (1992) examined the impacts of structural adjustment in the Philippines using an environmental-economic model to simulate the impact of the actual policies of SAP and alternative policies, which could have been undertaken by SAP. The authors constructed a multi-sectoral CGE model of the economy and combined it with environmental accounts and a population migration model. They point out the need to link the CGE model of the economy with environmental accounts in order to analyze how the economic changes result in changes in forestry and land use, energy use, generation of pollution and demand for other natural resources. The forest and land accounts were disaggregated by geographic area as well as ecological characteristics such as type of forest and agricultural potential. This was one of the first attempts in developing countries to create a framework that made use of both economic accounts and the environmental accounts for policy analysis.

Their analysis provided quite detailed results regarding the impact of SAP on the environment. Regarding forests, there was initially concern that SAP would encourage increased exploitation of forests; in fact, output from forests declined, partly due to the collapse of the domestic economy and domestic demand for forest products, but also in response to falling world market prices. Despite declining timber production, deforestation increased because of land clearing by impoverished households. While migration of poor people to forest lands as shifting cultivators trying to earn a subsistence livelihood was already occurring, the increased unemployment and poverty that resulted from SAP accelerated migration and the resulting deforestation. The environmental-economic model also showed that the negative impact of SAP could have been reduced if environmental concerns had been incorporated in SAP and safeguards put in place to protect forests and other resources. While their results may be disputed, the researchers did demonstrate the usefulness of such a model to understand this complex issue.

There is a long history in regional and forestry economics of applying input-output multiplier analysis to evaluate the employment and income effects of forestry on a local economy[15]. For example, the US Forest Service has developed an IO multiplier model that can be applied for every county in the country (Alward and Palmer, 1983; Loomis, 1993). This method is used to analyze the dependence of a local economy on forestry and to answer questions, such as, how will a change in forest land management affect the local economy? Will the loss of jobs in one sector (e.g. logging, saw milling) be offset by job gains in other sectors (e.g. tourism)? What are the effects on employment and income in other sectors of the economy?

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[15] Analysis also uses, where available, social accounting matrix models, which are IO models expanded to include more detailed information about the generation and spending of incomes among different categories of household.

Box 4. 2 - Indonesia: environmental-economic modelling and forestry

To assess the environmental implications of Indonesia's second long-term development plan (1994-2018), an environmental-economic model was constructed by integrating environmental accounts (land, forests, water, energy, pollution) with a multi-sector, dynamic input-output model (Hamilton, 1997; Lange, 1997). Land and forest accounts were disaggregated by geographic region and agricultural potential. Conflict over resource use and the deterioration of the environment required evaluations of trade-offs between economic growth and potentially serious degradation of the natural resource base, especially forests. The study assessed the demands of the country's development plans on the natural resource base and identified the kinds of technological and policy changes that might make it possible to achieve the development objectives given the environmental constraints.

In the late 1980s and early 1990s, much of the concern over deforestation in Indonesia had focused on excessive logging of natural forests for timber exports and, to a lesser extent, the clearing of forests by slash-and-burn cultivators. However, analysis revealed that a large and growing share of timber products was used domestically in manufacturing and construction. Promotion of rapid macroeconomic growth combined with plans to develop a large pulp and paper industry would increase demand for wood products and decimate Indonesia's forests, even with strict controls over timber exports. At the same time, the plan to maintain food self-sufficiency would require substantial increases in land for farming, which could further increase pressure on forests.

The analysis found that development objectives could be met only if there were substantial changes both in the forest and other sectors of the economy, as well as careful land use planning. The required changes included increased efficiency of timber harvesting and wood processing, increased efficiency of wood use in the construction industry, pricing policy reforms and, most importantly, an expansion of land under forest plantations to reduce pressure on natural forests. This last requirement brought the needs of sustainable forestry into conflict with agriculture. Detailed land accounts indicated that if forest plantations expanded only in degraded areas not suitable for agriculture it would still be possible to meet many agricultural objectives.

IO models represent the transactions among all sectors of the economy in a double-entry bookkeeping framework, where each transaction is recorded simultaneously as a sale and a purchase between two sectors (**Table 4.5**). This allows the calculation of 'upstream' and 'downstream' linkages from one sector to all others in the economy. The upstream linkages for logging, for example, include the direct inputs purchased by the logging sector such as fuel and materials, plus the indirect inputs needed to produce the direct inputs to logging. One can trace the impacts of logging on the economy by travelling downstream as well: the use of timber as input to sawmills, the use of sawn wood by other wood processing sectors, the use of these wood products further downstream, etc. At each stage, upstream and downstream, employment and income is generated. A small change in logging creates multiplier effects throughout the economy, affecting upstream and downstream industries and the employment and income associated with them.

Virtually all industrialized countries use these IO multiplier models, or more complex general equilibrium models based on a social accounting matrix (an IO table extended to trace the flows of income), for forestry impact assessments (e.g. Ashton and Pickens, 1992; British Columbia Ministry of Forestry, 1999; Macaulay Land Use Research Institute, 1999).

Multiplier analysis is also used in developing countries where IO tables are constructed, such as China, India, Indonesia, Philippines, Korea, Mexico, South Africa, etc. Simple forestry impact models are derived from national accounts and usually represent only the monetary transactions in an economy. Analysis has traditionally focused on income and employment impacts of forestry or changes in forest management, but not on the broader environmental impacts, or the impact of non-forestry policies on forests. To include impacts on the environment, hybrid IO tables have been constructed, which extend the standard IO tables for environmental data represented in physical units. 'Hybrid' refers to the mix of monetary and physical units in the table. Hybrid accounts have been used extensively for energy analysis (e.g. Miller and Blair, 1985; Pearson, 1989; UN, 1999). There has been some use of partial forestry IO models in conventional multiplier analysis, but such analyses usually include only the use and supply of wood products in physical units.

SEEA allows for the construction of a full hybrid forestry IO model that extends the IO tables constructed from SNA with SEEA satellite accounts for non-market goods and services related to forestry. Hybrid forestry IO models include the use of forest products (detailed supply and use table in monetary and physical units), use of non-timber products, land use and other environmental factors that may affect forests in a given area: energy, pollution, soil erosion, etc. The model thus includes physical and monetary data about all the forestry-related resources needed for sustainable forestry management and for assessing cross-sectoral impacts on forestry.

Table 4.5 shows the kinds of resource and environmental impacts that might be included in the forestry IO table. Each of the resources shown, such as non-wood products or land, would be further disaggregated by characteristics relevant to the economy and forest.

A new interest in forest and land accounts has emerged from international efforts to compensate for greenhouse gas emissions by creating carbon sinks in tropical forests. A growing number of studies have analyzed the potential value of forest land as a carbon sink compared to its value under alternative uses. Analyses of forest and land accounts in tropical countries have estimated reservation prices of farmers: the minimum payment farmers would be willing to accept for using forest land for carbon storage rather than other purposes. A study by Castro and Cordero (2001) estimated the reservation prices in eight regions of Costa Rica (which have different opportunity costs and carbon productivity) for 27 different agricultural activities. The reservation prices were lowest for livestock and rice and highest for export crops like coffee and pineapples.

The reservation price countries are willing to accept to store carbon in forests can be matched by the corresponding price that countries are willing to pay for carbon storage. There is extensive analysis in Europe, based in part on SEEA, of green taxes, especially carbon taxes. These models, usually multi-sectoral CGE models, use the energy and pollution accounts of SEEA to assess how high carbon taxes would have to be to achieve a target level of emissions. However, policy-makers can also consider other carbon mitigation measures, such

Table 4.5 - Hybrid forestry input-output table

A. Inter-industry table (in monetary units)

	Intermediate consumption by ISIC code							Final users			
	1	2	3	4	5	6	7	Consumption (public + private)	Imports	Exports	Capital formation
1. Agriculture											
2. Forestry											
3. Mining											
4. Manufacture of wood products											
5. Other manufacturing											
6. Utilities and trade											
7. Services											
Value-added											
Employment											

B. Extension for hybrid forestry IO table (in physical units)

Wood products									
Non-wood products									
Land									
Energy									
Pollution/soil erosion									

as purchase of tradable carbon emission permits or carbon storage by forests. Tropical forests can offer attractive options for carbon storage.

A Swedish study (Nilsson and Huhtala, 2000) analyzed the advantages to Sweden of purchasing carbon-trading permits as an alternative to implementing measures to reduce domestic levels of carbon emissions in order to meet Sweden's carbon target under the Kyoto Protocol. The analysis estimated a 'reservation price' indicating the maximum amount a country would be willing to pay for carbon storage in tropical forests. As carbon trading becomes established, the forestry accounts can be useful to help assess both sides of a trade: willingness to accept payment for carbon storage and willingness to pay.

FRAMEWORK FOR ANALYSIS OF CROSS-SECTORAL POLICY LINKAGES

SEEA-based framework

Based on the experience with forestry accounts reviewed above, a generalized SEEA-based framework for analyzing cross-sectoral linkages can be proposed. Some policy issues can be addressed by a relatively narrow forestry accounting framework, while others require more comprehensive accounts for forests and related resources. This framework may be used to assess three major kinds of issue:

1. Impact of forest use on macroeconomic performance. (Is economic growth based on the depletion of forests? What is the cost of deforestation?).
2. Full economic value of forests, including non-market values, taking into account linkages throughout the economy and impacts on all stakeholders.
3. Economy-wide impacts of non-forestry policies on forest use.

Each application, and the components of SEEA on which it is based, is discussed below. **Table 4.6** summarizes the components of SEEA required for each application.

Impact of forest use on macroeconomic performance: At the macroeconomic level, SEEA provides indicators of total forest value and the cost of forest depletion which may be used in macroeconomic planning, such as:

- GDP that includes the production of all forest benefits, market + non-market, not just those values included in SNA.
- NDP that includes the cost of forest depletion and environmental degradation.
- National savings and wealth adjusted to include the value of both cultivated and natural forests and the capitalized value of all forest goods and services, not just timber.

The indicators tell policy-makers, for example, how dependent the national economy is on forests, whether this dependence is increasing or the economy is becoming more diverse and the extent to which economic growth is sustainable or has been obtained by liquidating natural capital like forests. This macroeconomic indicator framework is used to integrate the results from more detailed analysis, such as simulation models, with measures of national economic performance.

Table 4.6 - Major applications of SEEA for sustainable forestry

Application	Components of SEEA used
1. Impact of forest use/deforestation on indicators of macroeconomic performance	
Measure of impact of deforestation or land-use change on aggregate indicators of macroeconomic performance	Forest and land asset accounts. Flow accounts for value of total production of forest goods and services, environmental degradation.
2. Assessment of trade-offs among competing uses of forests	
Economic value of alternative uses of forest and optimal mix of forest use for local/regional land use and development planning.	Forest flow accounts provide values for production of all forests goods and services, market and non-market, as well as environmental degradation. Flows can be capitalized into forest and land asset values under scenarios for alternative uses.
3. Economy-wide impacts of non-forestry policies, macroeconomic and sectoral	
Traces the full chain of causation from macroeconomic policy and non-forestry sector policies to decisions about land use and deforestation	Complete set of detailed asset and flow accounts for forests, land and other relevant resources Input-output table or Social Accounting Matrix

The components of SEEA used for this include:

- Asset accounts, physical and monetary, for forests and land, which provide the cost of depletion and forest values for national wealth and savings.
- Flow accounts for production of forest goods and services as well as environmental degradation which provide figures for total forest production for GDP; detailed supply and use accounts are not required.

Full economic value of forest ecosystems, accounting for benefits to non-forestry sectors: Forest accounts address one of the often-cited indirect causes of pressure on forests: the absence of market prices for non-timber benefits. Forestry accounts measure how non-forestry sectors benefit from forests and what they have to lose from deforestation. As the forest accounts from Sweden and South Africa showed, non-timber and, in general, non-market benefits are a substantial - if not the major - forest value.

SEEA provides information for a cost-benefit approach that may be used for local/regional land use and development planning to determine optimal forest use, ensuring that all forest values are taken into account. This analysis compares the economic trade-offs among competing uses of forest, such as logging, subsistence use of forests, recreation and tourism, conversion to agriculture, etc. The example from Malaysia (page 123) shows how land use conversion and deforestation could result from a lack of information about all the goods and services provided by forests to other sectors of the economy and a lack of institutions or regulations to monetize these services so that forest owners are compensated for the services forests provide. The SEEA components used for this application include the flow accounts, especially the non-timber values such as:

- Subsistence livelihoods (non-market goods provided as well as services used as input to livestock production).
- Recreation and tourism industry, biodiversity (in its own right and as part of a tourism industry).
- Services used as input to agriculture (livestock grazing, pollination, etc.).
- Protective services to soil and water (affecting activities as diverse as hydroelectric power generation, agriculture or fishing) or global climate (carbon sequestration value).

In a more extensive analysis, the value of forests under an alternative mix of uses may be capitalized into SEEA forest and land asset values to measure how different forest use and land use policies affect national wealth. This use of forestry accounts can provide a strong basis for building the cross-sectoral alliances necessary for sustainable forestry because it identifies how other sectors depend on and benefit from forests.

Economy-wide impacts of non-forestry policies on forestry: Simulation analysis is an ambitious economy-wide assessment of the chain of effects from policies at the macroeconomic level, through the activities and policies of different economic sectors to decisions by individual agents about the use of forests. Consequently, simulation analysis requires a great deal of data about the economy, the use of natural resources and the impact on the environment of economic activities. The examples for the Philippines and Indonesia used environmental-economic models based on a combined database of an IO/SAM and SEEA can trace the interdependencies of the economy and the environment and the chain of effects of economic policies on the natural resource base.

The components of SEEA that would typically be required for analysis of the sort carried out for Indonesia and the Philippines are shown in **Table 4.7**. They include forest, land and other related accounts depending on a country's specific environmental characteristics and policies. Forest asset accounts include timber and non-timber values, forest land and carbon sequestration. The asset accounts record the state of forests and their changes in a given year. Forest balance accounts are constructed from a combination of the forest asset and flow accounts. Forest flow accounts include the use of commercial and non-commercial wood products as well as non-wood goods and services throughout the economy. These accounts are included in order to trace the effect on forests of changing demands for forest products due to changes in policy. The demand and supply of commercial wood products are often included in analytical models; SEEA provides the same information for non-wood forest products and forest services. Environmental degradation that results from specific uses of forests and the impacts on other sectors of the economy would also be included.

The components of SEEA used for simulation models also include those resources that are closely related to forest use and deforestation, most importantly land. Land accounts have been constructed using many different types of classification depending on the purpose of the land accounts. For forestry issues, land could be classified by ecological characteristics such as type of land cover, slope and soil and agricultural potential. Land accounts can also be classified by economic or institutional characteristics such as degree of forest protection, accessibility to settlers, economic user of the land (with detailed accounts for users like agriculture and infrastructure, which put the most pressure on forest land). Finally, other accounts, such as pollution, energy and water, may be useful depending on the causes of deforestation in a particular country.

Table 4.7 - Components of SEEA used for simulation models

1. **FOREST ACCOUNTS**
   - **1.A Forest assets accounts**
     - Timber
     - Non-timber values (by major type of value)
     - Forest land (by type of tree-cover, availability for use, ecological characteristics including agricultural potential, slope, etc.)
     - Carbon storage
     - Forest balance accounts
   - **1.B Forest resource flow accounts**
     - Detailed supply and use tables for wood products, market + non-market
     - Detailed supply and use of non-timber goods and services
     - Environmental degradation from different forest-based activities
2. **LAND AND ECOSYSTEM ACCOUNTS**
   - Land use and land cover by economic sector and ecological characteristics appropriate to policy: agricultural potential, tourism potential, soil erosion potential, etc.
   - Land use change accounts
3. **OTHER RESOURCE ASSETS AND FLOW ACCOUNTS**
   - Pollution, energy, water as relevant to deforestation in a given country

Strengths and limitations of the SEEA framework for forestry

SEEA provides a powerful tool for analyzing policy impacts on forestry. Its major advantages, as discussed above, include the comprehensive treatment of all related environmental benefits and the integration of environmental information with national accounts. However, there are two kinds of limitation of SEEA that warrant some discussion. The first concerns the data requirements of SEEA and its applications, especially the simulation models. The second concerns the spatial disaggregation of SEEA; while official forestry accounts are usually compiled at the national level, local level accounts may be more useful for policy analysis.

Data requirements of SEEA and its policy applications: The first application of SEEA to sustainable forestry - assessing the contributions of forest goods and services to GDP and the cost of changes in forest land use - does not require a great deal of data. The basic forestry accounts are required and these can be constructed fairly easily from existing data. The second application requires more detailed information about the economic benefits to all stakeholders. Often the biophysical data may not be complete and economic valuation is challenging. But there is now a large body of literature to draw on for monetary valuation and a reasonable estimate of the value can often be obtained fairly easily.

Simulation models used to assess impacts of non-forestry policies on forests require a great deal of data. Even forestry multiplier models require input-output tables of the economy, which are not constructed by all developing countries and the data are not always very reliable. CGE models are designed to assess the response of households and firms to changes in market signals, such as the relative prices of products, labour or exports, so they are particularly well suited to addressing the cross-sectoral policy linkages affecting forestry. CGE models are based on SAMs, which represent the most detailed implementation of national accounts. The drawback of simulation modelling is the amount of data required. For countries that do not compile SAMs, IO tables may be available, which can be used for more limited simulation modelling.

Spatial characteristics of SEEA forest accounts: Researchers have noted that forest management is often a relatively localized phenomenon; a nation often has separate forests with different uses and economic values. At the national level, the value of forest ecosystem benefits may constitute a relatively small share of GDP, even when all the non-market benefits are accounted for. However, forest benefits may be very high for specific regions within a country. Moreover, SEEA is most often constructed at the national level, obscuring the regional and local importance of forests.

It is increasingly common to build national forest accounts from accounts for more detailed sub-national regions or for specific forests. For example, a collection of six case studies of forest accounts compiled for individual forests in Spain, USA and Costa Rica is provided in Campos (2001). For analysis of the impact of macroeconomic policies, a national-level model is necessary. In both the Philippine and Indonesian studies the disadvantage of national accounts was overcome by disaggregating forest and land accounts by geographic and ecological characteristics. The national-level framework of SEEA then became a *strength* rather than a weakness, because it provided a framework for consistent and comprehensive treatment of all land and forests, which in turn allowed aggregation of localized impacts to determine the cumulative impacts for the national economy.

SEEA AND SUSTAINABILITY INDICATORS FOR FORESTRY

In recent years, there have been a number of efforts to develop criteria and indicators for sustainable forestry, based on economic, social, ecological and institutional statistics. There is considerable overlap between work on sustainability indicators and SEEA, although these two efforts have proceeded, for the most part, independently of one another. One of the advantages of SEEA is that it produces both indicators as well as the detailed statistics needed for analysis. The relationship between SEEA and two sets of indicators of sustainability is described below. The first set, the Montreal Process indicators, provides a fairly well developed set of indicators for forests. The second set is based on the UN's Driving Force-State-Response system for sustainability indicators.

SEEA and the Montreal Process indicators

The Montreal Process represents one such attempt to develop and implement internationally agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests. (See their website http://www.mpci.org for more information.) The

Montreal Process has identified a set of *criteria*: categories of conditions or processes by which sustainable forest management may be assessed. Each criterion is characterized by a set of related *indicators*, quantitative or qualitative variables which can be measured or described and which, when observed periodically, demonstrate trends. **Table 4.8** shows the relationship between the Montreal Process criteria and indicators and the information provided by SEEA; many of the Montreal Process indicators are provided by SEEA.

Table 4.8 – Correspondence between sustainability indicators and SEEA

Criteria and indicators for sustainable forestry	SEEA source of indicator
Criterion 1: Conservation of biological diversity	
Indicators	
Ecosystem diversity	
a. Extent of area by forest type relative to total forest area	Forest asset accounts, physical
b. Extent of area by forest type and by age, class or successional stage	Forest asset accounts, physical
c. Extent of area by forest type in protected area categories as defined by IUCN or other classification systems	Forest asset accounts, physical
d. Extent of areas by forest type in protected areas defined by age, class or successional stage	Forest asset accounts, physical
e. Fragmentation of forest types	Can be included in forest asset accounts
Species diversity	
a. Number of forest-dependent species	Forest service accounts for biodiversity protection, physical
b. Status (threatened, rare, vulnerable, endangered or extinct) of forest-dependent species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment	Forest service accounts for biodiversity protection, physical
Genetic diversity	
a. Number of forest-dependent species that occupy a small portion of their former range	Could be calculated from changes in forest service accounts for biodiversity protection
b. Population levels of representative species from diverse habitats monitored across their range	Forest service accounts for biodiversity protection, physical
Criterion 2: Maintenance of productive capacity of forest ecosystems	
Indicators	
a. Area of forest land and net area of forest land available for timber production	Forest land and land asset accounts, physical
b. Total growing stock of both merchantable and non-merchantable tree species on forest land available for timber production	Forest asset accounts, physical
c. Area and growing stock of plantations of native and exotic species	Forest asset accounts, physical
d. Annual removal of wood products compared to the volume determined to be sustainable	Forest flow accounts for timber, physical
e. Annual removal of non-timber forest products (e.g. fur bearers, berries, mushrooms, game) compared to the level determined to be sustainable	Forest flow accounts for non-timber goods and services, physical

Criteria and indicators for sustainable forestry	**SEEA source of indicator**
Criterion 3: Maintenance of forest ecosystem health and vitality	
Indicators	
a. Area and percent of forest affected by processes or agents beyond the range of historic variation, e.g. by insects, disease, competition from exotic species, fire, storm, land clearance, permanent flooding, salinization and domestic animals	Only that part attributable for economic activities, such as land clearance and salinization
b. Area and percent of forest land subjected to levels of specific air pollutants (e.g. sulphates, nitrate, ozone) or ultraviolet B that may cause negative impacts on the forest ecosystem	Forest land accounts, land accounts, pollution accounts, physical
c. Area and percent of forest land with diminished biological components indicative of changes in fundamental ecological processes (e.g. soil nutrient cycling, seed dispersion, pollination) and/or ecological continuity (monitoring of functionally important species such as fungi, arboreal epiphytes, nematodes, beetles, wasps, etc.)	Forest degradation accounts (flow and/or asset), physical
Criterion 4: Conservation and maintenance of soil and water resources	
Indicators	
a. Area and percent of forest land with significant soil erosion	Land and forest land accounts by ecological characteristics, physical
b. Area and percent of forest land managed primarily for protective functions, e.g. watersheds, flood protection, avalanche protection, riparian zones	Forest land accounts, physical
c. Percent of stream kilometres in forested catchments in which stream flow and timing has significantly deviated from the historic range of variation	NA
d. Area and percent of forest land with significantly diminished soil organic matter and/or changes in other soil chemical properties	NA
e. Area and percent of forest land with significant compaction or change in soil physical properties resulting from human activities	NA
f. Percent of water bodies in forest areas (e.g. stream kilometres, lake hectares) with significant variance of biological diversity from the historic range of variability	NA
g. Percent of water bodies in forest areas (e.g. stream kilometres, lake hectares) with significant variation from the historic range of variability in pH, dissolved oxygen, levels of chemicals (electrical conductivity), sedimentation or temperature change	NA
h. Area and percent of forest land experiencing an accumulation of persistent toxic substances	NA
Criterion 5: Maintenance of forest contribution to global carbon cycles	
Indicators	
a. Total forest ecosystem biomass and carbon pool and, if appropriate, by forest type, age class and successional stages	Forest carbon storage accounts, physical
b. Contribution of forest ecosystems to the total global carbon budget, including absorption and release of carbon	Forest carbon storage accounts, physical

Criteria and indicators for sustainable forestry	**SEEA source of indicator**
(standing biomass, coarse woody debris, peat and soil carbon)	
c. Contribution of forest products to the global carbon budget	Forest carbon storage and flow accounts, physical
Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies	
Indicators	
Production and consumption	
a. Value and volume of wood and wood products production, including value added through downstream processing	Forest wood flow accounts, supply and use table, physical and monetary
b. Value and quantities of production of non-wood forest products	Forest non-timber flow accounts, physical and monetary
c. Supply and consumption of wood and wood products, including consumption per capita	Forest wood supply and use accounts, physical
d. Value of wood and non-wood products production as percentage of GDP	Forest flow accounts for goods and services, monetary
e. Degree of recycling of forest products	Forest wood supply and use accounts, physical
f. Supply and consumption/use of non-wood products	Forest non-timber flow accounts, physical
Recreation and tourism	
a. Area and percent of forest land managed for general recreation and tourism, in relation to the total area of forest land	Forest land asset accounts, physical
b. Number and type of facilities available for general recreation and tourism, in relation to population and forest area	Forest asset accounts, memorandum items for fixed capital
c. Number of visitor days attributed to recreation and tourism, in relation to population and forest area	Forest flow accounts for services, physical
Investment in the forest sector	
a. Value of investment, including investment in forest growing, forest health and management, planted forests, wood processing, recreation and tourism	Forest flow accounts + environmental expenditure and resource management accounts for forests
b. Level of expenditure on research and development and education	Environmental expenditure and resource management accounts for forests
c. Extension and use of new and improved technologies	Memorandum items to the asset accounts (fixed capital in the forest sector)
d. Rates of return on investment	Calculated from forest flow accounts, monetary
Cultural, social and spiritual needs and values	
a. Area and percent of forest land managed in relation to the total area of forest land to protect the range of cultural, social and spiritual needs and values	NA
b. Non-consumptive use forest values	Forest flow accounts for services, physical
Employment and community needs	
a. Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment	Forest flow accounts, memorandum items

Criteria and indicators for sustainable forestry	SEEA source of indicator
b. Average wage rates and injury rates in major employment categories within the forest sector	Wages: Forest flow accounts, memorandum items
c. Viability and adaptability to changing economic conditions of forest-dependent communities, including indigenous communities	NA
d. Area and percent of forest land used for subsistence purposes	Forest flow accounts, memorandum items
Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management	
Indicators for extent to which the **legal framework** (laws, regulations, guidelines) supports the conservation and sustainable management of forests	NA
Indicators for extent to which the **institutional framework** supports the conservation and sustainable management of forests	NA
Indicators for extent to which the **economic framework** supports the conservation and sustainable management of forests	Capacity provided by complete SEEA forest-related accounts
Capacity to measure and monitor changes in the conservation and sustainable management of forests	Capacity provided by complete SEEA forest-related accounts
Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services, including:	Capacity provided by complete SEEA forest-related accounts
a. Development of scientific understanding of forest ecosystem characteristics and functions	NA
b. Development of methodologies to measure and integrate environmental and social costs and benefits into markets and public policies and to reflect forest-related resource depletion or replenishment in national accounting systems	Capacity provided by complete SEEA forest-related accounts
c. New technologies and the capacity to assess the socio-economic consequences associated with the introduction of new technologies	Capacity provided by complete SEEA forest-related accounts
d. Enhancement of ability to predict impacts of human intervention on forests	Capacity provided by complete SEEA forest-related accounts
e. Ability to predict impacts on forests of possible climate change	NA

SEEA and the Driving Force-State-Response indicators

Indicators for forestry that can be derived from SEEA may be grouped for convenience within the Driving Force-State-Response Framework (DSR) adopted in 1995 by the UN Commission on Sustainable Development. In DSR, *driving force indicators* represent human activities, processes and patterns that have an impact on sustainable development; they provide an indication of causes of changes both positive and negative in the state of sustainable development. Driving force indicators can pertain to various levels and issues such as individual companies, sectors and demographic and social trends. *State indicators* can pertain to qualitative and quantitative dimensions of sustainable development, including abundance of natural resources, level of education, average life span, etc. *Response indicators* provide an indication of the willingness and effectiveness of society in providing responses to sustainability issues. Conceptually, no unique attribution of sustainability indicators into one of these three categories appears warranted as one and the same indicator could serve as a driving-force indicator as well as a state or response indicator. The following list (**Table 4.9**) provides examples of indicators that may be derived from SEEA; many additional indicators could also be obtained from SEEA.

Table 4.9 - Examples of indicators provided by SEEA for the DSR framework of indicators

1. Driving force indicators

Indicators provided by physical accounts for assets and material flows

- Ratio of closing stock to opening stock to assess deforestation, nationally and by sub-national region, where forest stocks and forest land are classified by the characteristics mentioned in section 2.
- Supply of forest goods and services, marketed and non-marketed.
- Use of forest goods and services by all sectors of the economy.
- Environmental degradation and pollution caused by timber harvesting/processing and other forest uses.
- Environmental degradation and pollution per unit of value added and per person employed by forestry-related sectors.

Indicators provided by monetary accounts for assets and material flows

National wealth and depletion

- Total national wealth including manufactured and natural capital.
- Share of forest assets in total wealth.
- Trends in per capita national wealth over time.
- Cost of degradation of forest resources.
- Conventional and environmentally adjusted gross and net value added and their components for the forestry sector (e.g. capital depreciation; wages and salaries; interest payments; profits) and ratios between.

Value of forests under present and alternative management

- Value of total flow of forest goods and services, marketed and non-marketed.
- Value of non-marketed goods and services as a share of total forest production.
- Ratio of the value of current mix of goods and services provided by forests to the potential value under alternative mix of forest uses.
- Amount of resources rent generated by forestry activities compared to resources rent generated by other natural resource sectors.
- Amount of rent recovered through stumpage and other fees compared to the costs of forest management, public and private.

Note that for all these indicators, trend analyses are possible based on time series data over successive accounting periods.

2. State indicators

Indicators provided by physical and monetary asset accounts

- Physical stock and economic value of forest and land.

- Physical stock and economic value of carbon in forests.

Indicators provided by physical and monetary flow accounts

- Inputs of forest services to other sectors (tourism, agriculture, etc.).
- Number of persons employed and person-years of employment in forestry and related sectors.
- Number of households dependent on forests for formal sector employment and for subsistence.

3. Response indicators

- Indicators provided by flow accounts, resource management accounts and memorandum items.
- Forest resource management costs incurred by government and the private sector.
- Environmental protection expenditures incurred by government and the private sector to remedy or prevent damage to forests.
- Ratio of management costs and environmental protection costs to income (value-added) generated by forests.
- Subsidies, taxes or user fees for forest use including charges for environmental degradation.
- Ratio of user fees and taxes to public management costs to determine whether the industry is paying the full costs.
- Ratio of user fees and taxes to resource rent to determine if government is recovering rent.

CONCLUSIONS

In most countries, forest accounts have mainly been used to assess forest asset values and the value of forest goods and services, providing a better indication of the benefits of forests to all sectors of the economy and what would be lost from deforestation. This information can be useful in cost-benefit analyses to assess the economic benefits and trade-offs from alternative uses of forests. Few countries have taken full advantage of the opportunities provided by forest accounts for analysis of the linkages between forestry and other sectors of the economy or macroeconomic developments. Part of the problem is one of information. Detailed information is needed about the flows of forest goods and services to each sector of the economy, as well as the use of land and other resources by each sector of the economy. As seen in Table 4.1, only developed countries compiled such detailed accounts on a regular basis. Two countries, Philippines and Indonesia, have used environmental accounts to examine cross-sectoral policy impacts on forestry. Although events have largely overtaken both these countries since the time of the studies, they illustrate the kind of analytical framework that may be developed from SEEA.

Sustainable development requires that forestry policy be addressed in a cross-sectoral context. This can be achieved only when there is a clear incentive to build an alliance among stakeholders in different sectors. A powerful incentive is the information that SEEA forest accounts provide about the economic benefits of forest ecosystems to non-forestry sectors, including rural development agencies, agriculture, fisheries, tourism, municipal water supply and others. Potential stakeholders include government, business and civil organizations, as well as private citizens.

In addition to the political and institutional motivation, SEEA forestry accounts provide a useful technical framework for analysis of cross-sectoral impacts. SEEA provides a framework for assessing the total economic value of forests, as well as a framework for linking information about forestry to the use of other resources and to the broader economy, integrating forestry policy with national development and monitoring interactions and feedback across different industries. Forestry sector managers gain important information from SEEA about the total economic value of forest resources, especially the inputs provided to sectors that are not part of the traditional forestry sector. Perhaps more importantly, SEEA puts the information they normally produce and work with in the context of the national economy. SEEA provides them with a tool to identify and address threats to forest resources that originate outside the forestry sector, which can improve their ability to protect this resource.

Policy-makers and stakeholders outside the forestry sector benefit from SEEA in several ways. First of all, SEEA provides a measure of the economic value of forest ecosystems to non-forestry sectors and the distribution of these benefits among different stakeholders in society. SEEA also provides better indicators of sustainable development that include forestry and forest land resources, as well as a method to integrate forestry into macroeconomic policy and planning tools. With SEEA forest valuation is linked to the national economy. This makes it possible to evaluate local and regional land use decisions in terms of how they affect the national economy.

SEEA can provide a powerful informational tool to promote cross-sectoral policy-making but no country is taking full advantage of its potential at this time. To be more effective, forest accounting practices need to be improved, partly in terms of technical content and partly in terms of how it communicates technical information to stakeholders. The following are some suggestions:

Technical improvements:

> *Increase forest accounting at the regional or forest-level.* Because forest utilization tends to be a local or regional issue, there is a need for more disaggregated forest accounts, rather than purely national forestry accounts. The increasing number of case studies that apply the SEEA framework to individual forests is a promising development.
>
> *Use existing information to begin constructing accounts for non-market goods and services.* Because the importance of tropical forests has been recognized worldwide, there is a great deal of information that may be used to construct forest accounts, even in countries with relatively limited data collection resources. The extensive body of literature on valuation of non-market forest goods and services can provide a starting point for many countries.

Communicating information to stakeholders:

To be effective in building alliances across different sectors and stakeholders, forestry information needs to be presented in a clear and policy-relevant manner, not just in the dry technical format of formal accounts. There are two ways to achieve this:

> *Build forest accounts around policy priorities.* An issue or set of issues such as carbon storage, rural livelihoods, tourism and biodiversity or watershed protection can provide a theme for communicating the results of the accounts. Clearly, the broader the group of stakeholders affected, the more effective the forestry accounts will be.
>
> *Develop easily-accessible, non-technical information for educating stakeholders.* A good example of such an approach is the publication, *Econnections*, by Statistics Canada,

which provides information from the environmental accounts of Canada. *Econnections* was designed as a tool to educate all stakeholders, government policy-makers, business groups, NGOs and even for use in schools. The first volume of the report presents the accounts for important environmental themes such as forests or energy use in terms of the policy issues they address. The second volume provides a more technical explanation of each account. An accompanying CD provides more detailed data so that users may perform their own analysis.

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Chapter 5

Mechanisms for coordination

Margaret A. Shannon

INTRODUCTION

Policy actors are any individual or group that is directly or indirectly, formally or informally, affiliated with or affected by the policy process at any stage. They can include governments, businesses, NGOs, civil society organizations and communities as well as individuals. Policy actors seek to influence the outcome of a policy process through either direct or indirect action. For example, a policy actor may directly participate in the process of defining policy goals and evaluating possible means to achieve them. Or, a policy actor may be a civil society organization struggling to bring local voices into policy decisions made at higher levels. Policy actors may also be those affected, positively or negatively, by a policy process. Thus, the term policy "actor" refers to a very broad spectrum of groups and individuals that are linked through their relationship to a policy process and its outcomes.

Over time, policy actors can become strongly linked to specific policy sectors and specific programmes – they become very inwardly focused. When there is a system of relationships binding policy actors closely to specific policies as direct beneficiaries, then the degree of policy change or likelihood of policy beneficiaries desiring change is low. Thus, if policies are tightly held in place, then coordination across policy sectors can be very difficult for it is viewed as threatening to the current *status quo*. If policies are more loosely related to the interests of beneficiaries, the structural and ideological preferences of organizations and agencies and the shifting alignment of political interests, then it may be somewhat easier to pursue efforts to integrate policies across sectors. Often it is actors who are not policy beneficiaries that desire greater policy coordination to better realize their interests by reducing the control of powerful actors over policy processes. Thus, conflict, critique and resistance may promote policy coordination and improve policy integration as current beneficiaries seek to maintain their position and new actors try to gain new benefits.

The challenge for actors striving to improve cross-sectoral policy coordination may be summarized by two simple principles:

- necessity of an "outward looking" attitude, and
- capacity to use information and experience to transform practice and procedure through critique and challenge.

This chapter develops a conceptual framework for a participatory[16] policy process aimed at improving the capacity of actors to coordinate and integrate their policy roles towards SFM.

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[16] FAO (2002). Proceedings of technical meeting on enhancing stakeholder participation in national forest programmes. Forestry Department, Rome. The Forests, Trees and People Programme (FTTP) executed by FAO Forestry Department from 1987 to December 2002, developed participatory tools and methodologies to promote community forestry.

Issues of power and participation are considered within an iterative and emergent governance framework. The final section addresses the changes occurring and needed to build governance institutions that support participatory processes and ensure that decisions are accountable and legitimate within a political community.

STEPS IN POLICY COORDINATION

The argument of this chapter is that policy coordination is by definition a communicative process and therefore taking a participatory approach is necessary. Policy processes are often thought of as linear: identify the problem, analyze different solutions to the problem, choose the best policy solution and implement it. In reality, of course, the process is much more complex. Indeed, it is often difficult to know if the process is moving towards a solution or to a better definition of the problem. This is because policy processes occur within policy communities. A policy community is composed of all the direct and indirect stakeholders in the outcome, all those with knowledge or expertise in the area, all those who are affected by the decision and all those who are interested. How does a policy community come together? The following discussions will look briefly at the different key steps **(Box 5.1)** in the formation of a policy community and policy processes within the framework discussed above.

Box 5.1 – Steps in policy coordination

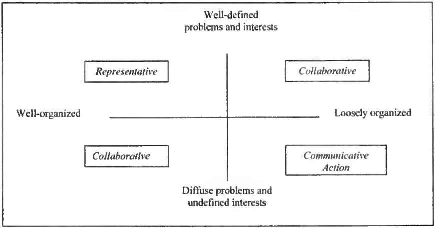
- Identifying a public problem
- Actors and identities
- Role of conflict in actor identity and problem definition
- Understanding power
- Convening and facilitating: key roles for policy actors
- Building "communicative action" capacity in policy communities

Identifying a public problem: How easily we take for granted the existence of a "public" (Stanley, 1990). Yet, the essential need of democratic processes is the creation of a public that can undertake the formidable responsibilities of self-governance. However, as the global agreements and principles for sustainable forest management and sustainability have implicitly recognized, the public arises in response to a "public question". And, a public question is one that was once private that is now open to public deliberation and the formulation of a public policy problem. It should be recognized at the outset that the creation of a public problem arises from many places: civil society, expert agencies, scientists, private enterprises or new political forms, and so on. One of the defining features of a democratic society is that public questions emerge through political discussions and lead towards revised social organization over time. Of course they also generally challenge the *status quo*, current distributions of power and wealth, accepted rationales for policy choices and unquestioned assumptions of fact and circumstance. Thus, public questions give a dynamic and fluid nature to democratic societies and are a key mechanism for change, adaptation and flexibility.

In order for the public question of "sustainable forest management" to emerge, political forums for discussion were necessary. UNCED brought wide attention to the need for increased political dialogue and resulted in the numerous different processes that provided opportunities for continued framing of the "problem of sustainable forest management". This question has led to new policy frameworks for integration, such as nfps, as well as new private policy initiatives, such as forest certification. This chapter builds upon these discussions and the expanded definition of the "problem" of SFM by asking how to improve the cross-sectoral coordination capacities of policy processes.

Actors and identities: How are actors defined in policy processes? Typically, the identity of the actors is defined through either formal designation (governmental agencies, trade associations, business associations, etc.) or informal recognition of interest. However, this assumes that the actors are already well organized around specific interests related to the policy problem at hand. In the context of SFM, this is often not the case. Indeed the reason for public deliberation is to define new actors and to allow "old" actors to take on new roles. **Figure 5.1** gives a general way of thinking about the relationship of the degree of organization of actors and the range of possible participatory processes.

Figure 5.1 - Typology of actor organization and definition of public problems



In the case of problems being well defined and actors well organized, then a *representational* approach to participatory processes is possible. This situation generally occurs as a public problem "matures" over time through political dialogue in the policy process. Actors slowly coalesce and organize around perceived interests, as the nature of the problem, viewed from different perspectives and with different possible outcomes, grows clearer. Thus, representational participation tends to be limited to those public problems where actors have previously defined their interests, already have clearly defined and distinctive roles and can identify solutions that promote their desired outcomes. Nonetheless, this situation is often taken to be the general one in policy formulation and leads to some of the frustrations and inefficiencies often associated with participatory processes.

Looking at the opposite end of the spectrum, we see problems that are diffuse and not well defined and interests that are loosely organized or perhaps just nascent. In these situations, participatory processes are clearly *communicative action*, where the objectives of the communicative process are two-fold: define the public problem and simultaneously define the actors and their roles. While understanding that all participatory processes entail communicative action, it is useful to recognize that in the situation where problems are being defined and actors are forming or changing their roles, the essence of the participatory process is communicative action. By this is meant that the degree of instrumental or strategic policy development is low since there is not a clear public problem or organized social interests. Indeed, one can expect that this part of the policy process may extend over years as the nature of the public problem is slowly understood and a shared understanding emerges through dialogue among actors.

The dialogue that has occurred around SFM is an excellent example of this type of participatory policy process. The problem of sustainability in forests has gone through many different kinds of definition with many different attempts to apply policy solutions. Today, most actors would say that SFM is still not a well-defined public problem and that actors are only slowly organizing or recognizing the need for new roles. The initiation of forest certification processes by industrial associations (sustainable forest initiative of the American Forest and Paper Trade Association), non-governmental interests (Forest Stewardship Council) and a loose association of actors in Europe (Pan-European Forest Certification) are excellent examples of the processes of both defining the public problem, organizing the actors within a policy community and developing new institutional arrangements (Meidinger, 2003b). As these different approaches are tested, the actors learn more about the nature of the problem and each other and they shape and re-shape their roles. The role of consumers and sellers of wood products in terms of the problem of SFM was completely redefined by FSC in 1993. By engaging consumers, NGOs and enterprises as a policy community engaged in public dialogue about how to ensure SFM globally, FSC is an example of generative deliberation and shows how this leads to defining problems, actors, information needs and possible solutions.

In some cases, problems become better defined but actors remain only loosely organized (Figure 5.1 upper right hand quadrant). For these situations, participatory processes move towards *collaboration* with a strong emphasis on communicative action processes. In this situation, the collaborative process contributes to defining the actors by engaging a broad and diverse policy community in public deliberation (Bennis and Biederman, 1997). Thus, the communicative action leads towards a better understanding of the problem, recognition of the actors, stakeholders and interests and why they are associated with this problem (Finger-Stich, 2003). For example, for a long time the problem of unsustainable forest management was considered to be one of population pressure. Thus, places with low population were not considered to be central in developing policies for SFM. Today, however, it is widely accepted that the forces of globalization, leading to practices that extract forest resources from areas with low population often with impunity due to a lack of protective policies are at least as much of a contribution to unsustainable forest management as population. Thus, new actors are forming with respect to this new understanding of the public problem and old actors are redefining their roles as a way to achieve SFM.

The other type of *collaboration* illustrated in Figure 5.1 occurs when the interests are fairly well defined, often in response to other problems, but the new public problem is still diffuse. Global warming and its contribution to problems of sustainability is an example of this kind of situation. There are numerous actors organized around issues related to global warming and these actors are now working together to better understand sustainability of forests within different scenarios of climate change. Research is under way on this topic and actors are rethinking their roles in terms of the need to have a global-scale political dialogue. So a collaborative approach is occurring wherein actors - bringing their different perspectives, information sources, knowledge contributions and capacities to address elements of this large problem - are working together.

One way of using Figure 5.1 is to diagnose the stage of problem definition and level of actor organization in order to develop an appropriate participatory process. For example, when representational processes are possible, then deliberative processes can focus on the missing key elements of information. When there is consensus on overall objectives, the deliberative process can focus on expert deliberation. When there are multiple objectives but information is relatively well known, then the focus is on political or negotiated deliberation. When both are clear - consensus on goals and information is available - then forms of procedural "deliberation" may be sufficient. Another way is to identify the nature of the problem based on consensus on values and the state of information and knowledge. Then, based on the type of deliberative process that is most appropriate, one can consider the degree to which there is a well-defined problem and the level of organization among actors. The more problems are still diffuse and actors loosely organized (if at all), the more generative deliberation is necessary with a strong recognition of the need for communicative action to lead to greater social organization and better problem definition.

While these conceptual approaches oversimplify some aspects of the situation, they are useful for diagnosing the kind of participatory process most suited to a situation and to explain why a participatory process is working or not working. Thus, they provide practitioners and researchers alike with a window into understanding the always complex and confusing social world.

The role of conflict in actor identity and problem definition: Missing from the discussion so far is the recognition of the importance and contribution of social conflict in political discussion. Often conflict is viewed as a destructive force that should be reduced or eliminated. Conflict is to be "managed." However, without conflict actors cannot define themselves. Actors define themselves in relation to others and "other" is recognized through recognition of difference. Thus, the recognition of difference leads to the establishment of boundaries between "self" and "other". These boundaries are the source of social groups, organizations, interests, preferences and so on. Thus, social conflict is an essential component of society and especially for democratic participation.

Boundary definition is one process of actor identification. As differences are recognized – differences of value, interest, personal characteristics, ways of behaving and so on – the relationship between "actor" and "other" is developed. Democratic theory rests on the belief in political equality for all – meaning equal opportunity to defining and addressing public problems. Thus, political deliberation provides the process by which actors learn about themselves and others through expression of different perspectives. It is for this reason that participatory processes are essential to cross-sectoral policy coordination and to defining public problems in that context.

Before thinking about how to understand conflict within the participatory process, it is useful to begin with looking at conflict within traditional democratic processes. Schattschneider (1960) argued persuasively that "democracy is a competitive political system in which competing leaders and organizations define the alternatives of public policy in such a way that the public can participate in the decision-making process". It is this aspect of a democratic system of government that most distinguishes it from other governmental forms. Thus, democracy thrives on conflict and is the mechanism by which "private conflicts" are brought into the public realm, meaning that the interference of public interests in previously "private" matters is legitimated. An example is the efforts by a private company to assert that its forest management is of concern to no one since it is fulfilling the role of giving consumers what they want. How the products are produced, with what by-products and effects, is the interest of no one but themselves. Certainly basic ideas of liberal economics follow this approach by adding the assumption that no business would act against its own long-term interests and that these interests are tied to the interests of society through the price mechanism in markets. Experience has taught us differently. Hence SFM brought the issue of how private individuals and companies manage their forests into the public realm; it legitimated the interest of the public and other actors in how the forest was managed.

The different approaches to forest certification demonstrate one way in which conflict in society occurs – through competitiveness (Elliott and Schlaepfer, 2003). Each of the different approaches to asserting the legitimate interests of outside groups in forest management competes for landowners. Each offers somewhat different benefits and provides different kinds of services. The result of this competition is both a better understanding of the problem as solutions are tried and the formation of an organized group of social actors interested in and capable of contributing to this problem. In addition, through conflict and experimentation new information and knowledge is growing through both "trial and error" and research.

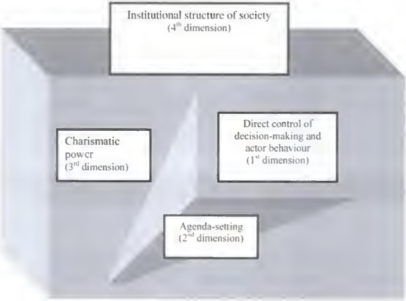
Understanding power: Whose values determine policy choices? Whose interests define the range of possible choices? Which issues are discussed and which not? Which options are never imagined? These questions all reveal the different dimensions of power. Power can sometimes be exercised directly when one actor has sufficient authority or command of financial resources to demand certain actions from another actor. Most models of policy formation and implementation assume this form of power. Policy-makers can make decisions based upon a set of values, goals and assumptions and then simply "command" implementation of these decisions. In this concept, policy is made in an authoritative context (international agreement, national legislation, agency directive, donor terms) and carried out by willing subordinates or clients. As discussed above, policy-making in this model is viewed as a linear one where policy is formulated within one context and implemented in others with minimal interaction between "formulators" and "implementers".

Figure 5.2 shows a conceptual framework of the relationships between the four dimensions of power. The first dimension of power focuses on the direct relationships between actors. The second recognizes the importance of indirect, non-decisions that control the attention of actors. The third recognizes the power in communicative action to develop new meanings, values, preferences and master metaphors that change the very terms of discourse, and the fourth is the context within which actors are located and which they take for granted as "the way things are". Relations of power bound all actions. This framework provides an analytical tool for understanding what kinds of power are affecting different actors, different problem definitions, different perspectives on priorities, different views of what kinds of cultural norms fit different policy processes. Without understanding social action within a framework of forms of power, it is impossible to either understand the actions of others or strategize for effective participation.

Even with this model of policy-making, however, only some problems are actually addressed and even then only some solutions are considered. This power to control the agenda is perhaps the most pervasive form of policy power in forestry today. The forestry sector resisted considering values beyond economic ones of production in forest management for a long time. Even now policy conflicts between actors are often at their core arguments about what the problem is (environmental protection or resource use?) and what the solutions are (sustainable forest management or nature reserves?). This form of power - the ability to control the agenda - is not as easily observable as power or direct control. However, this "non-decision making" form of power is often why innovations and new ideas are ignored and changes in the *status quo* avoided.

The third form of power is charismatic in that some actors are able to shape the values, preferences and interests of other actors through ideas, metaphors and media. In recent years, global forums on environment and forestry have developed new "master metaphors" for understanding the relationship between people and the environment. Concepts of "sustainability", "sustainable development", "sustainable forest management" and "biodiversity protection" are just a few examples of new concepts whose charismatic authority is reshaping policies across the globe and at all levels. These powerful ideas respond to the interests and values of a few actors and devalue the concerns of others. For example, the value of biodiversity globally may be viewed as more important than continuity of local livelihood strategies and traditional customs. Thus, when there is a conflict between local needs for resource use and development and nature reserves for biodiversity protection, biodiversity is given preference as a policy goal.

Figure 5.2 - Conceptual framework of the four dimensions of power


Institutional structure of society (4th dimension)
Charismatic power (3rd dimension)
Direct control of decision-making and actor behaviour (1st dimension)
Agenda-setting (2nd dimension)

There is a fourth level of power located in the very institutional structure of society. Institutions are shared patterns of behaviour, beliefs and world views. The institution of property, for example, is accepted as the way access to resources is organized and controlled by societies. There are different types of property ownership: state, private, communal, etc. Societal preference for these types is a feature of social organization and is accompanied by strong social values regarding the "right" way to organize resource access. Institutions may emerge slowly over time as people repeat patterns of behaviour or they may be created full-blown as when societies are in transition. Indeed, it is this conscious creation of social institutions that describes a "society in transition". There are many countries in transition in the world today working to structure new institutional frameworks and facing significant social challenges in meeting basic social needs. Forests, as a source of capital, are often at the centre of these discussions. However, the extent to which new forestry policies can integrate the values of the international arena as well as the needs of the country and its people is very dependent upon developing strong processes for policy coordination (Rankovic and Nonic, 2002; Weber, 2002).

Convening and facilitating: key roles for policy actors: Two key participatory roles are "convening" the policy community and "facilitating" the deliberative process. While traditionally one might expect governments to have a strong convening role, today trade organizations and civil society organizations are also undertaking the role of convening policy communities. This role is made manifest when a question is brought into the public arena for discussion – a public problem is defined. The ISO 14000 environmental management standards evolved from an interesting example of a policy community. The International Organization for Standardization (ISO) is composed of national standard setting organizations, some of which are quasi-public and others are private. The public problem of environmental management standards emerged during UNCED. ISO responded by giving this task to a technical task group (TC 207) charged with developing specific policies and standards. When this task group meets, the actors represent all (or as many as choose to attend) the national-level members worldwide. Thus, the convening of this policy community links local and national actors within a global context in order to open the definition of the problem to a wider and more generally applicable context. The ISO framework facilitates a primarily "expert deliberation" process that has resulted in globally accepted standards for environmental management in enterprises and governments. Indeed, under the General Agreement on Tariffs and Trade and various European Union treaties, there is a preference for consensus-based international standards. As a result, this policy community plays a significant role in promoting the capacity for policy integration by means of a standard setting process. Of course, power plays a strong part in this as in most policy communities. It would be fair to say that the dominant members of ISO are trade associations, large multinational corporations and the consultants who serve them.

While ISO is an example of a fairly closed policy community, SFM may be an example of a more open and fluid policy community. Indeed, it would be difficult to name all the actors and organizations associated with the SFM policy community. Certainly it is a community with membership ranging from global actors to very localized individuals and groups. It is a policy community that is open in terms of defining the problem as well as in welcoming new actors as members. It is also a community that is struggling to develop the kind of knowledge and information needed to address the problem of SFM. Thus, as a policy community, SFM illustrates generative deliberation and is clearly based upon processes of communicative action.

The SFM policy community is a loosely organized network of actors around the problem of SFM. As coalitions of actors coalesce, ways of addressing elements of SFM are tried and the whole policy community learns through these experiences of trial and error. Governments respond with new legislative frameworks. NGOs contribute knowledge, information and integration capacities. Businesses and trade associations contribute resources and capacities to undertake new forest management approaches. Thus, gradually a body of experience grows from practice, generalizations emerge through research and reflection and the problem is better understood as actors adopt new or changed roles. This kind of process is one of communicative action. It is a form of generative politics in that new ideas, actors, groups, organizations, state responsibilities and many other changes emerge.

Building "communicative action" capacity in policy communities: Communicative action or generative deliberation in policy is necessary when the agreement on the basic values at stake and meaning of the problem is low and, in addition, there is a lack of sufficient information and knowledge or actor organization to design policy solutions. In this type of deliberation, a broad range of actors – civil society groups, individuals, governments, trade associations, businesses, experts, scientists and so on – are engaged in the participatory process. This process creates new knowledge and mechanisms for developing and sharing information as well as new ideas, values and problem definitions. Rather than imagining a single process for participation, this kind of complex policy community can be thought of as a network of participatory processes. The policy community "exists" to the extent that the actors within the network recognize that they have in common a shared interest in a general policy arena.

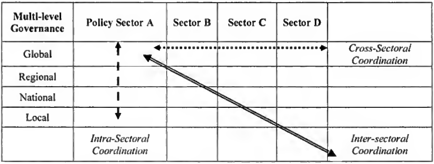
To the extent that parts of this complex network try to remain separate from these dynamics, these parts inhibit the generative capacity of the policy community. This is the reason that policy coordination across sectors becomes such an important issue when working on problems like SFM or sustainability. When government, for example, remains wedded to a formal, linear process of policy development – formulation then implementation – it is exercising a form of power based on its ability to control the agenda by forcing the process into a particular institutional environment. Other policy actors realize they are disadvantaged in this context and seek to shift the terms of discourse and the membership of the policy community. These competing forces for "openness and transparency" versus "backroom meetings and directives" are typical in policy processes. The forest policy sector must first open itself to greater participation of actors within the forest policy community and then reach further to engage actors from other policy sectors, policy communities and other institutional environments. Otherwise, the lack of openness and transparency will impede the deliberations of the policy community leading only to exit and protest.

One way to convene a policy community is by using information. For example, "monitoring and adaptation" processes create "reflective information" – information about how things are working. This kind of information can be effectively used to enhance generative deliberation by opening past policies to question and critique, but in a constructive way. As those actors affected by as well as interested join in these discussions within the policy community, this information animates the process of actor organization, definition of the problem and identification of new possible solutions. However, for policy change to occur there will have to be a serious commitment to learning from new information. This is where new institutions are important in terms of facilitating new forms of behaviour by adopting new policy solutions.

ACTIONS FOR IMPROVING POLICY COORDINATION

The demand for inter-sectoral policy integration stretches beyond just the environmental arenas into the agricultural, social welfare, economic and other policy spheres (Sandel, 1996). For example, meeting the challenge of abandoned or neglected forest land in parts of Europe requires addressing the livelihood needs of local people as well as the ecological implications of a changed landscape. Meeting the challenge of these new demands for integration is difficult and time-consuming and requires new relationships to be built among very different policy networks, academic disciplines and administrative agencies (Shannon, 1999). **Figure 5.3** defines the differences between "intra-sectoral", "cross-sectoral" and "inter-sectoral" policy coordination. This figure shows that quite different actors, processes and institutions would be involved depending on the type of coordination process.

Figure 5.3 - Types of coordination across and within policy sectors[17]



Multi-level Governance	Policy Sector A	Sector B	Sector C	Sector D	
Global					*Cross-Sectoral Coordination*
Regional					
National					
Local					
	Intra-Sectoral Coordination				*Inter-sectoral Coordination*

The result of integrative and participatory linking processes is a form of "loosely coupled" network organization that works at *multiple levels through horizontal networks*. Rather than a focus on the vertical integration of levels of governance (a federalist framework), this framework suggests multiple levels of policy, planning and administration that are linked through both demands for policy integration and participatory processes (Benz, 1999). At each level, there are numerous networks that reflect the problems of that scale of governance. Clearly, both agencies and NGOs play important roles in vertical integration across these levels of governance. However, this is different from assuming that each lower level is simply a subset of higher levels in terms of desired policy goals and outcomes. In a multilevel system, there is only a loose-coupling between levels based on the integrative and participatory processes that link them. Thus, legitimation is the outcome of open, transparent participatory processes. There is also, of course, the "feedback" process based on the actual responses of the ecological or social systems to policies and actions.

Institutions are enduring patterns of relationships that provide rules and processes to guide future behaviour of actors and organizations.[18] Policy processes serve as institutions that shape the behaviour of policy actors (Meidinger, 2003 a,b). As discussed in Chapter 1, policy sectors composed of public and private actors within a specific sphere of interest – forestry, agriculture, health, rural development and so on – characterize many societies today. Since these sectors provide the home for a sectorally-focused policy community, they seldom are outward looking or change oriented. It is only when a problem arises linking many sectors that this inward focus is challenged and the sectoral policy communities begin to expand their membership. This is the process we have observed in SFM over the last decade or so. However, only gradually is the desirability for greater policy coordination and indeed integration becoming recognized by different sectors. If we assume the desirability of improved policy coordination, then what improvement might emerging institutional arrangements offer (**Box 5.2**)?

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[17] This diagram was developed by Working Group 1 of the EU COST Action E-19 on "National forest programmes in a European context" at its meeting in March 2002 in Savonlinna, Finland, on policy coordination. http://www.metla.fi/eu/cost/e19/

Box 5.2 – Actions for improving policy coordination

- Information sharing
- Spatial-integration of policy and planning
- Create multi-stakeholder groups related to a specific territory
- Capacity building for participatory processes

Information sharing: Today information is often sector-based. If information gathering were changed to focus on a territorial approach (spatial integration), then the artificial divisions among sectors would no longer mask the linkage of their roles, responsibilities and effects upon one another. Environmental performance monitoring and environmental impact statements are two existing mechanisms that could be redesigned to provide this service. If there were greater interdisciplinarity in these kinds of information gathering and monitoring approaches, then it would be more likely that information relevant to many sectors would result. In addition, by making these processes participatory, it is possible to incorporate "local and traditional knowledge", "experiential knowledge" and new ideas generated through communicative action processes.

Spatial-integration of policy and planning: Within a sectoral context, policy and planning focused on the specific objectives and desired outcomes for that sector. If, however, integrated policy and planning processes, like the national forest programme process, provide a framework for several linked sectors to join in policy and planning efforts, then policy integration and coordination becomes much more likely. Using national forest programmes as an institutional framework for improved policy coordination and integration is still in the early stages of development. However, since it is directly focused on the mechanisms discussed in this chapter, it is a very promising institutional innovation (Hyttinen and Niskanen, 1999).

There are other institutional arrangements that utilize a territorial approach for policy integration. The Man and Biosphere Reserve programme (MAB) is one of the oldest institutions directly aimed at the general problem of sustainability and SFM within a social, economic and ecological context. The Biosphere Reserve concept is exceptionally flexible as

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[18] This definition differs from common usage in European countries where an "institution" is more like a fixed organization. In social theory, institution refers to the social processes that create predictability in social behaviour, but are open to change through the adoption of new behaviour patterns.

an institutional framework and thus can respond easily to local conditions, traditions, resources and social needs. What the concept provides is a template for how to link land, resources and people that then can guide actors within a participatory process in developing the needed information and social capacity to work towards improved social and ecological conditions.

It is also possible for forest sector planning processes to become integrative policy institutions. To undertake this new role, forest planning needs to become explicitly outwardly focused and to consciously engage the larger policy community, including the relevant policy sectors affected by and affecting forests and forest policy. The example in chapter 2 of the Mexico Forest Plan is an excellent application of this approach.

Create multi-stakeholder groups related to a specific territory: This kind of mechanism is perhaps the most common around the world because (1) it is participatory and (2) it is adaptable to any spatial scale. When it is clear who the stakeholders are in a problem, then it is possible to engage in a "negotiated" process that results in a consensus policy (perhaps with expressed minority viewpoints, but with the majority prevailing). When the policy community is less well defined, then these groups fall within the arena of communicative action and generative deliberation. In this context, the commonality of the territory helps to frame the problem and the interests of the actors. Working together, actors learn about themselves and others and new knowledge is created. A generative deliberative process can result in new ideas, values and approaches to a shared problem that is spatially integrative and coordinates the contributions of different actors.

It is also possible to set up multi-stakeholder informal groups whose purpose is information sharing as well as informal policy coordination. Generally such groups are composed of government representatives who have specific competencies within a common administrative area. However, such a group in the case of forestry, for example, can be organized to allow for a much broader discussion. An example is the Biodiversity Council in the state of California (USA). This Biodiversity Council is made up of federal, state and some local government officials and they meet to share their plans and expectations for the future as they may affect biodiversity. This Council originated from the concern that the processes of suburban development in response to population growth were slowly eliminating the "oak woodland" ecosystem. This shared concern led to the creation of a forum for discussion that has since expanded the agenda as problems emerge or are better understood.

Capacity building for participatory processes: The kinds of participatory and generative process discussed in this chapter need skilled actors who are aware of their roles. Participatory processes can be designed to build these skills as a part of the process. However, the demands on some actors - experts, scientists, citizens - may exceed their preparedness. In the case of experts and scientists, various kinds of training programmes can be developed to improve their ability to work within a participatory and highly transparent policy process. In the case of citizens, there needs to be a foundation of understanding of the role of a citizen in democratic processes. In many societies there are long traditions of discussion, consensus and change. These traditional modes of community dialogue are invaluable resources for engaging local people in complex policy processes in a useful and rewarding way.

These are only a few examples of how institutions can facilitate the improvement of policy coordination across and among sectors. By drawing from the different contexts[10] of participatory processes and the kinds of information sharing needed to improve policy coordination, policy entrepreneurs can convene new policy communities and thereby form new institutional frameworks.

CONCLUSIONS

Whereas historically policy issues have been located within relatively autonomous policy sectors supported by separate government bureaux, the emphasis today is on developing cross-sectoral policies that link policy networks and purposes and affect desired changes in policy outcomes. When actors, agencies, NGOs and political resources that have traditionally ignored one another are suddenly forced (often by legal or political challenges to current practices) to work together, the first reaction is often animosity and territorial behaviour. However, the kinds of problem forest policy addresses today demand integration because no one policy sector, agency or political actor can effectively address the problem alone. The new issues cross boundaries ecologically, socially, politically, administratively and legally. Indeed, frequently several regions, states and countries are involved and their separate regimes must find ways to work together on a common problem.

From an actor's point of view, policy coordination entails creating a new identity, new relationships and new ways of working with others. This means that actors are engaged in conflict, learning, communication and other processes requiring them to change. Traditional bureaucratic organizations were not designed for conflict and change; they were designed for order and stability. Thus, for most government actors in policy processes these new demands strike at the heart of their core identity and structure. While government agencies are evolving towards network organizations more able to engage in policy coordination processes, this is a slow process. In the meantime, more flexible organizations like NGOs are taking the leadership role in organizing policy communities to work towards improved policy coordination.

The essential features of participatory processes discussed in this chapter are just a beginning from which more complex patterns of communicative action and deliberation can grow over time. *The more actors are engaged in participatory processes for policy coordination, the better they will be at doing it.* This is partly because actors will develop new skills, but mostly due to changes in organizational structure that will facilitate building collaborative organizations capable of addressing complex coordination problems. Thus, we can expect to see a new generation of organizational forms developing as governments, NGOs, business and community organizations change as a result of participating in policy coordination processes.

Conflict and power are always critical dimensions of relationships among actors. The types of deliberation that fit different kinds of situation take explicit account of these factors. When the core uncertainty is in knowledge and technical capacity, then experts receive more deference than when the conflicts are about values and priorities. One error commonly found in policy coordination processes is to rely upon scientific information as if it were a "neutral" arbiter among value conflicts. It is not and never can be. Science can help us understand and scientists can be important actors in policy processes, but science is not a substitute for ethical and normative choices. However, in similar fashion, when powerful actors seek to push policy towards their interests in the face of scientific and technical challenge, then deliberative *fora* need to be able to provide a counterweight by calling upon both scientific and public accountability. Thus, policy coordination processes need to be designed with the specific context in mind and aimed towards building both trust among actors and legitimacy within society by ensuring technically and politically accountable outcomes.

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[10] FAO/ECE/ILO (2000). Public participation in forestry in Europe and North America. ILO, Geneva.

Communicative action theory provides the grounding for understanding the implications of deliberative forms of discourse. However, practice provides the "action learning" complement to theory building for improved public processes. Thus, scholars and practitioners must work and learn together in order to realize the promise of democracy as well as to improve democratic theory. This dialectic of "practice and theory" distinguishes the field of public participation and transforms not only the practitioner but also the citizen into a "civic scientist" engaged in improving our understanding of the world and people around us. The "public" in public participation is both the sovereign in terms of accountability and legitimacy and the source of practical knowledge and public judgement. This complex role requires practitioners and scholars to recognize the challenges of public participation and seek ideas and methods designed to improve it.

Examining policy coordination from the actor's point of view shifts our attention away from the content and towards the process. However, the context and content of policies does indeed affect the processes of coordination. There are several ways to relate context and process in such a way as to adequately address both the process (power, actor identity, conflict, etc.) dimensions and the content (technical and scientific knowledge, issue, place, etc.) of the policies. A participatory approach to policy coordination that integrates both place-based contexts with actor-centred processes provides a promising avenue for improving policy coordination leading towards SFM practices.

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